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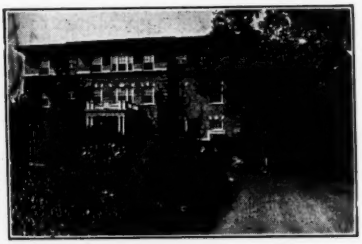

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Vol. 120, No. 5 NOVEMBER - DECEMBER 1954 Serial Nos. 875 and 876

THE RELATIONSHIP OF THE VEGETATIVE NERVOUS SYSTEM TO UREMIA

LEO HESS, M.D.[1]

"Dunque a l'essenza . . . . Più che in alt convien che si mova la mente."—DANTE, Paradiso, canto XXVI, 31.

INTRODUCTION

Since R. Bright's epochal work the attention of both pathologists and clinicians has been concentrated on the close study of the pathologic changes of the kidney and of their relation to the clinical signs of nephritis and uremia. It was particularly in Virchow's era that detailed knowledge of the structural and cellular alterations of the kidney was accumulated. In human pathology there exists no disease of long standing that is limited to a single organ. Indeed, every instance of a chronic illness confronts one with the involvement of numerous organs or even of the whole system. In his studies of nephritis Bright noticed, in addition to the renal lesions, edema of the skin, effusions in the serous cavities and enlargement of the heart. Anemia with a progressive fall of hemoglobin is a regular feature of Bright's disease. It is especially marked in the preuremic and the uremic states. In uremia it is usually associated with leukocytosis. Edema of the lungs, according to personal investigation, is commonly found in uremic patients. Edema of the brain may furthermore be mentioned as a frequent sign at the autopsy table—in striking contrast to the dryness of all the inner organs and of the skin in the non-edematous cases. The cerebral arteries are often found to be thickened even in the younger patients. Retinal changes, "inflammatory" alterations of all the sections of the gastro-intestinal tract, of the pericardium and of the skin (Roessle) are well-known features of uremia. A large number of anatomic signs are obviously associated with uremia. What is the link between all these alterations? The organic signs may vary in degree in the various organs, as will be demonstrated; the kidneys themselves may be entirely spared ("aglomerular uremia").

It is in the field of biochemistry that profound metabolic changes of the protein bodies, of cholesterol and of the ion content with acidosis have been revealed. The reduction or loss of complement of the serum in uremics is truly amazing.

From the clinical point of view, the numerous signs in the sphere of the central nervous system and, above all, in the realm of the "vegetative" nerves are contributing factors of the protean picture.

The conclusion follows: Uremia does not designate a disease limited to the kidney, nor can it be adequately described in terms of renal histologic changes. Uremia constitutes an aggregate of multiple anatomic and functional lesions. Is this aggregate incidental, the result of anarchy in the realm of the visceral organs, or is it dominated by a certain element enabling one to link the many signs together and to interpret them as dependent upon one pathogenic principle? The search for a specific toxic agent which would account for all the signs, that has been undertaken many times, has so far been unsuccessful. Acidosis, isosthenuria, the "vegetative" signs can all be accounted for by a derangement of the "vegetative centers." *Central nervous disorders associated with ana-*

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tomic lesions of the kidneys is the conditio sine qua non of *"nephritic" uremia.*

Introductory Remarks on Physiology and Anatomy of the Kidney

Before entering more deeply into the pathogenesis of uremia, one question may be raised —one which has not been adequately treated in literature—the question of how the vegetative nervous system, the great regulator of all the inner organs, is implicated in physiologic renal activity.

Under the impact of C. Darwin's memorable work, the antagonism both between species and species and between organs and organs within the higher organism (Roux "Kampf der Teile im Organismus') has been over-emphasized. One must realize that the harmony of organs as well as of their parts deserves attention in the large field of biology and medicine. Embryologically, the precision of the fusion of the secretory and excretory parts of the kidney—the first ones (glomeruli, primary and secondary convoluted tubules and Henle's tubules and Henle's loops) derived from the meanephros, the second from the "Polroehren"—is evidence of remarkable harmony. Whether this is due to a local, intrinsic, or to a nervous factor inside or outside the kidney cannot be stated. We will presently see the role that harmony or regulation plays in the physiologic activity of the kidney.

Richard's concept, that filtration and reabsorption are the two main elements of renal function, seems to be generally accepted. Little room, if any, is left to a true secretion, (Starling and Verney). In this process the gross output of water and salts and of the other components of urine, as well as the maintenance of the acid-base balance of the blood—the isohydria—are included.

The human kidney is built up of one million or more nephrons (Vimtrup) or vasculonephric units (Trueta). The nephrons do not start growing at the same time nor do they grow at equal rates. Each nephron carries its nerves, and has its central representation within the diencephalon. A regulator is therefore required to safeguard their development as well as to guarantee the proper, harmonious function, i.e., a harmonious structural-functional equilibrium. Oliver has demonstrated that this equilibrium is maintained even under abnormal conditions. Were a part of the kidney removed, the functional load of the remainder would be increased. A disproportionate growth of the convoluted tubules would then meet the functional demand. According to him, "the latter do not however perform more or less per gram of functioning tissue than they did under original, normal conditions." Obviously, the physiologic equilibrium is maintained because a regulator protects the inner medium even under abnormal circumstances. This is true only to a certain point, at which the breakdown of the equilibrium marks the onset of a diseased condition. (In acromegalics a lengthening of the proximal convolute tubules was noticed (Graffin). The vegetative nerves carry out the regulatory process. All the nephrons, despite their individual representation within the diencephalon, are evidently integrated into *one* functional unit. This hypothesis may throw some light on the interesting fact that in acute nephritis *all* the nephrons are equally involved. Practically none is spared. In the article on "esophagospasm and gastrospasm" it was emphasized that the involvement of an *entire* organ (total gastrospasm, total dilatation of the stomach) means a "central" and not a "peripheral" origin. We may then suggest that already in the acute stages of nephritis a central nervous element is at work. Clinical studies confirm the suggestion.

It is worth mentioning that under normal conditions the filtration through the glomerulus is balanced by reabsorption from the tubules in order to assure the maintenance of the blood volume. A chart from Dunn's paper will illustrate this point:

Displacement of fluids

	Liters per day	*cc. per minute*
Urine	1.5	1.0
Glomerular filtrate	100.0	69.4
Reabsorbed	98.5	68.4

Again, the harmonious regulation of blood volume, glomerulus filtration and reabsorption from the tubules require a vegetative nervous reflex.

There is anatomic evidence (Dunn) that the activity of the individual glomeruli is physio-

logically intermittent. If there is no intermission, if all the glomeruli are active at the same time due to an absence of the nervous regulator, marked oliguria will result.

The normal excretion of water and of the chlorides by day exceeds that by night, in accordance with the general lowering of bodily functions. The adaptation of the kidney to the twenty-four hour cycle depends upon a regulator. Noteworthy in that connection is the maintenance of the urea level within the blood, without wide variations by day or night.

This writer had an opportunity to observe around eighty normal workers in a coal mine district (Maehrisch Ostrau) many years ago. Interestingly enough, a study of these night-workers showed that the ratio of day and night urine was reversed.

Polyuria after intake of a large amount of water is another feature of the adaptability of the normal kidney. Actually, the onset of marked polyuria takes place within one half or two hours after the drinking of water, reminding one of a so-called "latent period." The bulk of the water first passes from the intestinal vessels, accompanied by salts, into the tissue spaces. From there it is slowly discharged to the kidneys by the blood stream and finally eliminated. This diuresis is the result of a suppression of the pituitary anti-diuretic principle present in the blood, brought about by vegetative nerves. Under emotional stress, by muscular exercise, in anesthesized animals or after nerve stimulation the diuretic effect under discussion is inhibited.

The main renal artery and vein can be constricted by intra-venous injection of adrenaline (Trueta), independently of the systemic blood pressure. The same narrowing of the caliber of the renal vessels along with blanching of the renal cortex was observed by Trueta after the application of a tourniquet to the hind leg of a rabbit, or after the stimulation of the ischidiacus or of a splanchnic nerve. As a result of nervous stimulation the renal cortex may be entirely deprived of blood, while the medullary vessels are congested (Trueta). The functional ischemia of the cortex gives rise to temporary anuria. After severing the splanchnic nerve, the involved reflex is abolished. The physiologic inverse proportionality of the cortical and medullary blood flow is brought about by a nervous regulator. Masson, in his investigation of the neuro-vascular glomus of the skin which regulates the dual pathway of the blood through the superficial and the deep vasculature, suggested that a certain independent action of the "periphery" might exist. This reminds one of Bier's experiments on collateral circulation, which is evidently not dependent upon a nervous reflex, but is directed by the oxygen demand of the living tissues ("Blutgefuehl der Gewebe"). At first glance one might assume that the mechanism regulating the distribution of the blood between cortex and medulla of the kidney possesses its independence. The other regulatory processes mentioned above may be subject to the same doubt. It is important to note that Trueta, although he did not emphasize the point, did observe vasomotor changes in both kidneys after unilateral stimulation of the splanchic nerve or after application of a tourniquet to one hind leg. In personal studies on the vasomotor reflexes (20) of humans, the same bilateral response was noticed after unilateral stimulation. Trueta's observations clearly demonstrate that a nervous principle is an important regulator of the renal circulation.

Even more decisive from our point of view is the harmonious correlation between kidney and liver (the constant urea level of the blood), and between kidney, lung, and skin (isohydria).

Drew's experiments on tissue culture provided evidence to the effect that the various parts of a tissue are in some way coordinated outside the living body, as far as growth and development are concerned. These important findings merely serve to demonstrate the connection of the various parts of *one* tissue. Of necessity, the interrelation of *multiple* organs requires the intervention of a nervous factor.

Physiologic diuresis is closely connected with the neural lobe of the hypophysis and with the supra-optic nucleus, the three organs—nucleus supraopticus, posterior lobe of the hypophysis, nephron—actually representing *one* functional unit. As Ranson and his co-workers have shown, the hypothalamus may also be concerned with the hydration of the tissues and with the shift of water between the intra-cellular and extra-cellular spaces, and between the latter

and the blood. On the other hand, an antidiuretic hormone is produced in the posterior lobe of the pituitary and probably in the tuber cinereum. This hormone, although its main influence is directed to the hypothalamic vegetative center, may also act on the kidney proper. Polyuria was found after a lesion to the floor of the fourth ventricle, between the vagus and the vestibular nuclei (C. Bernard). According to Jungmann, puncture of the center of carbohydrate metabolism in the medulla oblongata also causes diuresis. Brugsch, Dresel, and Levy recognized a region medial to the spinal tract of the trigeminus nerve, ventro-medial to the corpus restiforme and dorsal to the nucleus of the facial nerve, which regulates the elimination of water and NaCl.

The supra-renal cortex is known to play an important role in water and NaCl metabolism. The bearing of the endocrine hormones, especially of testosterone and estrogen, will not be discussed in this article.

Viewed anatomically, one may recall the presence of multipolar ganglion cells and nerve fibers at the very beginning of the renal artery ("ganglion renale"). One should also note the peri-arterial plexus, particularly well developed around the vas afferens, and the numerous nerve fibers found in the capsule, sinus, pelvis, and within the epithelial cells of the tubuli contorti and recti. Hirt described fibers coursing from the adrenals into the renal parenchyma. The juxta-glomerular apparatus, which has been likened to Masson's myoarterial glomus, mentioned previously, may also be subject to nervous stimuli. Its function is still sub judice. The vas afferens and efferens is endowed with a strong muscular wall. Thus it may effectively influence the pressure and filtration through the glomerulus.

Physiology and anatomy attest that kidney tissue and the "vegetative" nerves are closely interwoven. Biologically, there is no means of separating the two structures.

The nerve fibers of the kidneys originate from the sympathetic as well as the parasympathetic system. The uppermost center is located in the diencephalon. The pre-ganglionic fibers of the ganglion renale are directly derived from the sympathetic trunk; its postganglionic fibers course exclusively to the kidney. The vagus fibers first enter the ganglion celiacum, then reach the kidney proper: The renal ganglion is, according to personal studies, homologous to Wisberg's ganglion near the aorta and to the ganglion ciliare.

The Hepatorenal Syndrome

The intimate, physiologic relationship of kidney and liver, and its dependence on a vegetative nervous reflex, was mentioned above. It seems worthwhile to return to this interesting phenomenon.

In catarrhal jaundice, traces of albumin and yellow-colored casts are frequently found. At the height of the disease injection of salyrgan results in profuse diuresis, indicative of a latent retention of water within the system, possibly within the liver. After subsidence of the icterus, this test is negative. With decreasing jaundice an abundant output of urine is known to occur. In acute yellow atrophy of the liver, Hess noticed oliguria or anuria whith no detectable damage to the kidney. In biliary cirrhosis the decline of temperature coincides with a decrease of jaundice and with polyuria. In icteric infants with congenital atresia of the bile ducts, oliguria and albuminuria are common. Subsequent to operations on the bile ducts (in cases of mechanical obstruction and profound icterus) delirium, coma, oliguria, anuria, and edema have been reported (Helvig and Schutz). No infection was demonstrable post mortem in these cases. The histologic study revealed severe degeneration of the tubules, but no glomerular lesion (aglomerular uremia?). Icterus combined with nephritis and signs of uremia mark Weil's disease. McLeod and his co-workers found complete anuria subsequent to total hepatectomy in dogs.

In this connection three cases studied by Faltitschek and Hess should be cited. Despite large amounts of direct bilirubin in the blood stream and frank jaundice, the urine of these patients contained no bile. The urinary output was small (300 to 700 cc. daily). The NPN was 42 to 214 mg per cent. The impermeability for bilirubin and for the nitrogenous metabolic products of the kidney was a functional disorder which cleared by itself. Most authors suggest a toxic product derived from the liver as the etiologic factor of the

hepato-renal syndrome. The poison has never been found, however. In our opinion, the marked and progressive acidosis which, without exception, attends true uremia as well as hepatic insufficiency might be an important element of the syndrome. The role of acidosis in uremia has been discussed in a previous article.

It is interesting to note that Furtwaengler observed diffuse cortical necrosis of both kidneys subsequent to rupture of the liver. In the light of Trueta's work, cortical necrosis of the kidney can be accounted for by reflex-ischemia of the glomerular arterioles and diversion of the blood toward the medulla. Trauma to the abdomen antedates the onset of acute yellow atrophy in some cases. No less a man than R. Beneke ponders the possibility of a spasm of the hepatic artery as the participating factor. Oliguria would lend itself to an analogous explanation. Rokitansky, to whom credit is due for first describing this disease, simply remarked that "a *nervous* disturbance probably was the causative factor of acute atrophy of the liver."

Nervous Signs Associated with True Nephritic Uremia

In a previous article the most common "vegetative" signs of uremia were briefly summarized. In this article the author intends to discuss some other cerebral signs, and to attempt an interpretation and evaluation as to the pathogenesis of uremia. The discussion will be limited to those nervous signs which are generally assumed to be linked with profound renal failure. Headache, for example, so common a sign of eclampsia and pseudo-uremia, does not belong to true uremia *sensu strictissimo*. (The signs of "little" uremia will not be discussed either.)

Undoubtedly of *cerebral* origin are the alterations of consciousness ranging from mental depression, indifference, and apathy to drowsiness and even to delirium. The patient's attention cannot easily be fixed. He may suddenly, like the narcoleptic, fall asleep. One might surmise a certain degree of diffuse, cerebral damage—which is probable also because of the lack of initiative, the involuntary movements of the extremities or of the trunk, and a tendency toward catalepsy with the patients.

Most fascinating is the inversion of the sleep mechanism—that is, restlessness by night with nycturia, and somnolence by day. This abnormal type of sleep is known to occur in epidemic encephalitis with anatomic changes predominantly located in the brain system. Experimental lesions to the caudal part of the lateral hyptothalamus, as Ranson and his coworkers pointed out, result in sopor. Near this area all the "vegetative" signs of uremia may be located.

The appearance of the patient will be sketchily described: The expression of his pale yellowish face, with its flabby muscles, the large eye slits and the staring gaze, suggests a state of anxiety. The corners of the mouth are lowered. The forehead and the region around the eyes reveal evidence of tension. The arms and legs are relaxed, extended or flexed upon the abdomen. Rarely we see spasticity of the extremities. In the studies on angina pectoris, anxiety was traced back to a diencephalic focus (19), in accordance with the experiments of W. R. Hess.

A rapid loss of weight, independent of intestinal disorders, results in marked cachexia. It may even occur in uremic episodes, subsiding with the improvement of the general condition.

No. 98372, S. R., male, 69 years of age, complained of noticeable weakness and weight loss (25 pounds within a few weeks). The patient was thin, emaciated. Urine showed a low, fixed specific gravity (1.001—1.009), albumin++, NPN Viio mg.%. $CC^{2}35$, chlorides 520. Marked delay in excretion and poor excretion of dye on both sides. BP 180/100. On forcing fluids and bed rest, NPN came down to 40. The patient recovered.

The pre-uremic and uremic cachexia is comparable to the weight loss in instances of encephalitis, brain tumor, morphinism, hypopituitarism, and tabes (tabes marantica). This is *cerebral* cachexia.

Coupled with the loss of weight is muscular weakness. This may precede all other clinical signs, even hypertension. In any case it is combined with azotemia. It is revealed by the flabbiness of the facial muscles and the inability of the patient to sit up; he is apt to fall forward. All voluntary motions are rare and slow. Contrasting with this extreme weakness of the voluntary muscle are the vigorous respiratory movements. The patient does not

seem to notice the latter. Although it is not easy to give an accurate account of this striking phenomenon; one should note the weakness with sclerosis of the cerebral arteries. In tabes dorsalis there occur spells of weakness and exhaustion similar to the other, better-known vegetative crises. Weakness attends diabetes mellitus, and is an important premonitory sign of impending coma. It may, on the other hand, be subsequent to hypoglycemia. Weakness is a symptom of all pituitary diseases. Hypo- as well as hypertonia arterialis may be associated with adynamia. Weakness is an outstanding feature of Addison's disease, with no visible atrophy of the muscles. One may, with due precaution, infer that muscular weakness has some connection with the nervous system; adrenalin has been called the ergotropic factor, as it selectively stimulates the systematic blood pressure, thereby increasing the blood supply to the active muscles through dilated muscular capillaries, and mobilizing the required carbohydrates. Derangement of the physiologic "nutrition reflex" (22), which is controlled by the vegetative centers, will lead to an impairment of nutrition and of muscular efficiency.

Anorexia is a most frequent, although not an obligatory sign.

Hiccough, incessant wretching, and vomiting have been dealt with in previous articles. The latter is associated with neither headache nor with bradycardia.

Dryness of tongue, mouth, and skin, with complete loss of turgor, are characteristic of the *advanced* stage of uremia. The relation of these signs to the vegetative nerves has already been discussed.

Diarrhea under increased vagus impulses, following an initial phase of constipation, sometimes dominates the scene (choleriform type of uremia). It accentuates the loss of weight and cachexia, since appetite may be entirely absent. Nevertheless, the author is convinced that sudden weight loss often antedates diarrhea.

The observer of uremia is struck by its similarity to the clinical picture of "decomposition ("infantile atrophy"), a syndrome that has been rare in recent years. Many signs are common to both conditions: prostration with extreme adynamia, marked dryness of the skin and of the mucous membranes, pallor, bradycardia, Kussmaul's respiration, miosis, a tendency to cataleptic positions, constipation changing to profuse watery movements, anorexia, vomiting, alteration of consciousness, oliguria with albuminuria and cylindruria, progressive acidosis, and increasing NPN. Although "intoxication" was judged the essence of the condition, no special poison was demoonstrated. The damage to the kidneys post mortem is mild and probably secondary. As far as personal experience goes, these infants revealed signs of severe rickets or of lymphatic hyperplasia, evidencing the fact that a certain constitutional factor was operative. In nephritics with a trend to edema ("nephrotic" type) the same constitutional pecularity seems prevalent (19). Acidosis with the profound disturbance of the electrolyte balance within the blood plasma—in other words, the loss of "homeostasis"—(8), may well account for all the clinical manifestations of infantile atrophy.

The problem of hypertension cannot be discussed in this article. It is not a sign of true uremia.

Pruritus, although frequently found in patients having azotemia, may also be present in cases of cardiac failure. In studies of jaundice (19) its connection with a nervous disposition was evident. This is further indicated by the favorable response to lumbar puncture (Widal), to ergotamine, to procaine, and to calcium salts. It may come on in attacks, or may be permanent. Sometimes it is an early symptom of uremia.

The tendon reflexes and dermographic response are mostly increased, the former finally changing to areflexia. In contrast to eclampsia, there is no Babinski sign.

The muscles are sensitive to pressure.

As mentioned in a previous article, the pupils are miotic.

Next let us turn to the NPN, whose retention with true nephritic uremia is beyond all doubt. First, it is not limited to uremia. A transitory increase of blood urea subsequent to anesthesia, nervous excitement and trauma has been reported. In instances of benign hypertension, the simultaneous occurrence of hyperglycemia and hyperuricemia without detectable renal damage in noteworthy. With bronchial asthma the uric acid content of the blood is

often raised. These observations support the suggestion that the retention of NPN is, to a certain extent, dependent on vegetative nervous reflexes ("extrarenal azotemia"). The rise of NPN in Addison's disease with its numerous vegetative abnormalities points in the same direction. Aside from the dysfunction of the kidney, this nervous factor may play a role in uremic NPN retention.

Hypersensitivity to certain drugs (iodine, chloral hydrate and, in some cases, pyramidon) may be found in uremic patients. This is hardly the place for a discussion of nexus between uremia and allergy. After experimental elimination of the vegetative nerves, especially of the vascoconstrictor nerves, the allergic reaction of the kidney is markedly increased and more stormy (Kaiserling). Peri-arteriitis nodosa, an allergic condition according to modern concept, my give rise to nephritis and uremia (19) when affecting the renal artery.

Autopsy Findings of Nephritic Uremia

Essential Findings. 1. Eccentric hypertrophy of the heart, particularly of the left ventricle. One should keep in mind that heart hypertrophy of asthenics is not as marked as that in hypersthenic types. Advanced cachexia may mask the hypertrophy.

2. Sclerosis of the arteries ad basim cerebri. According to personal experience, sclerosis of the arteries of the circulus Willisi and of its main branches is most frequently found even in young patients; it is never missed in uremic individuals of middle or advanced age.

3. C. V. Monakow found degenerative changes of the plexus choroidei.

4. W. Berblinger stated that in two-thirds of all long-standing nephritis cases the basophilic cells of the anterior pituitary lobe are numerically preponderant, especially in cases of uremia. This statement has recently been questioned.

5. Oesterreicher's xanthydrol reaction reveals considerable accumulation of urea within the cortex cerebri and the oblongata.

6. On close study, edema of the intestinal mucosa—particularly of the ileocecal portion—will never be missed. Occasionally it is associated with local ulcerative changes. This edema is probably related to the vicarious elimination of waste products, brought about by a nervous regulation.

7. Edema of the lungs—terminal, or occurring spasmodically throughout life (so-called "asthma uremicum")—is, according to personal studies, most frequent. Evidence has been adduced (19) to the effect that increased vagus impulses may result in brochospasm, in vasodilatation, and in acute edema of the lungs. Sympathol and atropin, by lowering the vagus impulses, may relieve the condition.

8. Anemia of the inner organs.

9. According to Roessle, xanthydrol reaction and "inflammatory" signs of the skin. Circumscribed edema and petechiae in the chorium are evidently dependent upon vasomotor changes.

10. Edema of the brain.

Occasional Findings. 1. Sterile pericarditis (R. Bright; Banti), sometimes associated with degenerative changes of the myocardium. Rarely found in uremic children.

2. Acute dilatation of the stomach. For example:

No. 98564, S. H., 67 years of age, male, white, admitted because of prostration, anorexia, hiccough, and poor diuresis amounting to 4 or 5 ounces per 24-hour period. Pale, emaciated; leathery skin, centrally ulcerated papules over the entire body. Severe pruritus. Miosis of both pupils. Fixed specific gravity of the urine (never above 1011). Alb. and casts. NPN 66 to 107 mg.%. TP. 5.9. Cholesterol 336, CO_2 41, BP 160/90. An autopsy: Chronic glomerulonephritis and pyelonephritis. Right double kidney pelvis. *Stomach tremendously dilated,* but a normal mucous membrane with normal rugal pattern. No evidence of gastritis or of mechanical obstruction.

No. 99702, C. V., 65 years of age, male. Irrational, having increased tendon reflexes, oliguria (4 ounces within 24 hours), persistent hiccough, marked dehydration, arterial hypertension 180/100, albuminuria and hematuria, N.PN. 184, CO_2 27.5, calcium 8.2, TP 6.36. Fluoroscopy showed a *markedly dilate stomach with fluid and gas.* No autopsy was performed.

Hughes and his co-workers mentioned *pronounced distention of both the stomach and the jejunum* in a case of acute nephritis with uremia.

3. Proliferation of microglia, mostly in the white matter (Bodechtel).

4. Chronic, fibrotic changes of the meninges.

5. Petechiae (skin, serous membranes including the meninges and mucous membranes).

We are to deal with this problem elsewhere.

6. Pancreatic changes (Baggenstoss).

From the autopsy findings outlined above, one may draw the conclusion that in nephritic uremia anatomic changes of the nervous system represent a substantial portion of the post mortem picture.

The severe anatomic changes of the liver, so common in eclamptics, are not a feature of true uremia.

RENAL SIGNS OF NERVOUS ORIGIN OTHER THAN THE ONES OF NEPHRITIC UREMIA

Polyuria. 1. After convulsions (epilepsy, hysteria), and after attacks of migraine. According to personal experience, this type of polyuria occurs only after diurnal epileptic attacks.

2. After attacks of angina pectoris.

3. After trauma to the head with the return of a normal conscience.

4. After the "crisis" of lobar pneumonia, seldom immediately before the crisis. Coincident with polyuria is the excretion of chlorides in the urine, regularly retained at the height of the disease.

5. In the course of Grave's disease, along with pytalism and diarrheas.

6. Several hours following atropin injection (H. Eppinger and L. Hess).

7. After a chilling of the body surface.

8. After a large intake of water.

In all these instances the polyuria is transitory and in this respect different from permanent polyuria in diabetes insipidus, and diabetes mellitus, and chronic nephritis. The nature of transient polyuria, which the author has occasionally observed in paranoics, is not clear.

Oliguria. Aside from occurring with heart failure, organic lesions of the kidneys, and organic diseases of the liver (19), oliguria has been observed in the following conditions.

1. Diseases of the diencephalon (17) and certain tumors of the brain.

2. "Crises gastriques", for example:

M. N., 45 years of age, male. Argyll Robertson, areflexia of both knees and achilles reflexes, positive Romberg. During an attack of "crise gastrique," accompanied by severe abdominal pains and vomiting the patient, despite an intake of 1200 cc. of liquid by mouth and intravenous glucose infusion of 500 cc., passed but 350 cc. of concentrated urine within 24 hours. After the crisis passed, aboundant diuresis (approx. 300 cc.) of pale urine occurred.

3. Following the sudden release by catheter of urine from a distended bladder.

4. After an attack of unilateral nephrolithiasis ("reno- or uretero-renal reflex").

In this connection Boeminghaus' observation, which clearly indicates the role of the sympathetic nerves in the reno-renal reflex, is important.

After pyelotomy to the right kdney and removal of stones, bleeding from a capsular vein, extreme oliguria (about 20 cc. released by catheterization of the left ureter), meteorism, constipation, coma, sudden death. Autopsy revealed: Necrosis totalis renis dextri (due to thrombosis of many arterial branches), necrosis incipiens tubulorum contortorum renis sinistri (some of the glomeruli almost anemic, some hyper-emic—the latter near the capsule). Some vasa afferentia to a certain section entirely free of blood, utterly narrow, so that the endothelial layers of the capillary wall lie one upon the other. The retro-cecal tissues were filled with hemorrhage, the suffusion reaching the radix mesenterii, thereby irritating the plexus solaris and producing both meteorism (by inhibition of the peristalsis) and reflex anuria. The condition was similar yet not identical to cortical necrosis. The mechanism can easily be understood in the light of Trueta's experiments.

5. After operations on the bile duts, as already discussed, or on the colon (Staehli).

6. After excessive perspiration, in contrast to polyuria which occurs after a large intake of water.

7. In infantile atrophy without anatomic lesions of the kidneys.

8. After severe burns (this type of amuria needs further investigation.)

9. During electro-shock therapy of depressed patients.

Albuminuria. 1. After big meals, cold baths, and violent muscular exercise (such as wrestling and running), lasting for but a few hours.

2. The so-called "lordotic" albuminuria, presenting a host of nervous signs (fainting, acrocyanosis, lability of blood-pressure, marked bradycardia in reclining position, headache, etc.). One should note that even under normal conditions the urinary output in erect position is not as great as that in a recumbent one (7).

3. Mild albuminuria and cylindruria is common in newborn infants. Both the underdeveloped cortex of the kidney and the underdeveloped central nervous system are deserving our attention.

As for diuresis with organic changes of the kidney, such as acute nephritis and nephrosis—there may be a sudden and unexpected onset of diuresis after several days of marked oliguria. This diuresis cannot be explained in terms of renal pathology. Most impressive to the author, in the course of acute nephritis, was the coincidence of albuminuria and oliguria with miosis, bradycardia, constipation changing to diarrhea without apparent reason, and a tendency to hypertension a very early sign which may rise and fall precipitously. All these signs illustrate the intimate connection of renal functions with the vegetative nerves.

From the experimental viewpoint it is noteworthy that in experiments with uranyl acetate in rabbits, the elimination of albumin was lowered or altogether abolished after adrenalin injections (21). To quote only one experiment:

> A rabbit, 1780 g. was for 7 consecutive days given 0.5 cc. of a 5% watery solution of uranyl nitrate by intraperitioned injections. The urine contained considerable amounts of albumin. On the eighth day only a few cc. of urine, containing albumin and casts, was secreted. The rabbit was extremely weak, exhausted and refused food. The uranyl injections were discontinued for 2 days. Still the urine and general condition of the animal remained the same. For 4 consecutive days two drops of adrenalin (1:1000) were administered intravenously. After the second injection the albumin content of the urine was markedly lowered, disappearing completely after the third adrenalin injection.

Trueta's recently published experiments mentioned above, may provide an explanation of these observations.

As early as 1877 Charcot suggested a nervous origin of "hysterical" anuria. One may infer that many "nephritic" signs occur without detectable renal damage. In some instances, e.g., in the experimental uranyl nephritis, adrenalin, a neurotropic agent, exerts a decisive influence upon the amount of albumin excretion.

Comment

That a nervous element is of importance in nephritic uremia hardly seems doubtful. Exactly how does the nervous system operate in that condition? In the normal body it is not the proper function of all the organs; it is, rather, the synthesis of well-balanced activities of all that creates a healthy living unit. As for the activities of the various parts, two features are essential:

1. Adaptability to all demands. The counterpart to this in the inanimate world is the principle of Le Chatelier and the "law of mass action."

2. Ability to repair. In the adult human kidney the glomerulus cannot regenerate, although a compensatory hypertrophy of glomeruli and of convoluted tubules is known to occur. There is no counterpart in lifeless matter.

The synthesis, i.e., the proper equilibrium throughout the system and the maintenance of a steady inner medium, the harmony of Hippocrates or, in modern terms, Cannon's homeostasis, is a dominating principle in both physiology and medicine. The equilibrium concerns the parts of every single organ—intra-organic—as well as the interrelationship of all the organs with one another—"interorganic equilibrium."

The steadiness of the *milieu interne* comprises the physiochemical equilibrium as stated in Van Slyke's and Henderson's laws, and the chemical constancy brought about by the equilibrium of hormones and enzymes. It is the modern expression of Hippocrates' "eucrasia."

To be sure, there are some primitive organisms which live without blood and without nerves. There is, furthermore, no denial of the fact that in the experimental animal the grafted kidney deprived of its nerves may go on functioning. In the living human body, however, *the nervous intervention is indispensible, especially as far as the interrelationship of the various organs is concerned.*

In order to explain how this principle of nervous regulation which carries out an integrative function in the normal body applies to nephritic uremia, it might be well to return to some of the physiological data mentioned in the second section of this article.

The normal kidney. 1. Intermittency of capillary flow within the glomeruli. It is abolished after severing the splanchnic nerve.

2. Maintenance of the proper hydrostatic pressure within the tuft of the glomerulus by

means of an influence on the caliber of the afferent and of the efferent artery. Secondly, a possible activity of the juxta-glomerular apparatus.

3. Duality of the blood supply to the renal cortex and medulla.

4. Glomerular filtration and tubular reabsorption of water. (The site of water reabsorption seems to be different from that of the reabsorption of electrolytes).

Note: By these four reflexes the constancy of blood volume is effected.

5. Glomerular filtration and tubular reabsorption of glucose, of certain salts, and of nitrogenous products. This assures isoionia, isohydria, and the constancy of sugar-and-NPN-content of the blood.

6. Liver-kidney relationship. It guarantees the constancy of the urea level of the blood. In comparison to body weight, the urea output of children is greater than that of adults. Since in children the urobilin content of the urine is simultaneously increased, one may infer that the liver-kidney relationship differs with age.

7. Physiologic rhythm of diuresis with a larger urinary output by day. The newborn infant does not void until some 12 to 48 hours after birth.

8. Relationship between kidney and intestines. It is especially important in the case of a large ljquid intake. At the height of digestion there is a minimal blood supply to the kidney, and vice versa.

10. Physiologic growth of the kidney. It parallels, to a certain degree, the growth of the central nervous system. Ratio between kidney and body weight is 1:170 in the adult, 1:140 at birth. Oliguria, edema and mild albuminuria occur in the newborn child.

11. Relationship between kidney and suprarenal gland. Just before birth the weight of the suprarenal amounts to about one-third of that of the kidney, in the adult it is about 1:28 (Aschoff). At the time of birth and within the following two years a peculiar process of necrobiosis and regeneration takes place within the suprarenal cortex. At puberty there is another period of marked cortical growth. After the fifth decade the organ undergoes its senile involution. To what extent these changes are dominated directly by hormones or nerves cannot be stated. Physiologic water retention and oliguria associated with a swelling of the liver during menstration (F. Chvostek), furthermore, a tendency toward fugitive edema, coincide with a swelling of the glomerulosa in the suprarenal cortex. During normal pregnancy, with its well known trend to water retention, a decided hypertrophy of this layer occurs. This retrogresses during puerperium.

The afferent and efferent arteries of the renal glomerulus carry a strong muscular layer, indicative of their liability to changes of caliber under nervous influence. The same holds true of the strikingly great muscular content of the suprarenal veins. Their pumping and sucking work is undoubtedly controlled directly by adrenalin, indirectly by the sympathetic nerves.

The adrenal cortex under hormone or nervous influence controls the output of water, potassium, and sodium by the glomeruli.

12. Relationship between kidney, suprarenal gland, and intestines. According to Verzar, a phosphorylation of fat and glucose within the intestinal wall is achieved by the adrenals. Cortin furthermore counteracts insulin, thereby regulating the content of sugar in the liver and ultimately in the blood. (The humoral relationship between kidney and thyroid gland will not be discussed in this article.)

B. When, in addition to organic lesions to the kidney, the nervous regulations give way.

1. Simultaneous filtration through all the glomeruli (Dunn). It results in water retention, edema, oliguria. Water retention is not a feature of true uremia.

2. Anemia and anoxia of the glomeruli, accompanied by a congestion of the medulla renis (bilateral cortical necrosis). It results in retention of water and of certain waste products.

3. Lack of tubular reabsorption. It results in polyuria and, as was discussed in the second article, in isosthenuria.

4. Failure of filtration through the glomerular membrane. It results in a retention of glucose, of nitrogenous matter, and of potassium (chronic nephritis). Potassium ions stimulate the parasympathetic nerves. Failure of tubular reabsorption (phloridzin glycosuria and other types of renal glycosuria). Neither po-

tassium retention nor hyperglycemia is a constant sign of nephritic uremia. None of the components of the retained NPN—urea, uric acid, amino acids, creatinine—are toxic.

5. Urea retention ("hepato-renal" syndrome, chronic nephritis, acute yellow atrophy). In the latter the epithelial cells of the tubules are filled with lipoids. There is marked oliguria (19) and retention of NPN.

6. Nycturia, i.e., the reversal of the normal state of urinary secretion (chronic nephritis). It is certainly of interest to note that this is often accompanied by night sweat and salivation.

7. Acidosis with a marked lowering of the alkali reserve, the obligatory and ominous sign of true uremia. It is very frequently combined with uremic exanthemata and uremic respiratory disorders. Acidosis may further impair the kidney function, thus giving rise to complete, sudden anuria.

8. Uremic diarrhea.

9. Disproportionate growth of tubuli in cases of acromegaly. Irregularity of the renal structure in chronic nephritis. ("Metallaxie", according to studies by Jores (25) and by Oliver (28).

10. The physiologic process of infantile necrobiosis within the cortex of the suprarenal gland during early childhood is absent in hemi- or anencephaly. In some cases of nephritis a loss of water and of NaCl occurs (Thorn), finally resulting in nephritic uremia ("hypochloremic uremia").

In all these reflexes sympathetic as well as para-sympathetic fibers are involved. This is in accordance with Langley's law of innervation which holds true of all organs, with the possible exception of the lacrimal gland (cf. L. Hess, *Pathogenesis of Glaucoma*). The physiologic balance between the two antagonistic nervous influences manifests itself in the intra- and interorganic equilibrium within the body. In the light of this concept not only the means of understanding the numerous signs and symptoms, but also the necessary link are obtained This makes one harmonious unit of the host of clinical and anatomic signs.

In the healthy body the temperature with its well-known fluctuations is regulated by a complex mechanism within the diencephalon (the heat and cooling center). In uremia there is a tendency toward hypothermia, which is maintained at a low and even level, evidencing practically no variations (isothermia). This hypothermia, resulting from an overwhelming parasympathetic influence, may also occur without uremia, e.g., in nephrotic children. Such hypothermia may, however, suddenly change—with no apparent reason—into hyperpyrexia.

Ptyalism, occasionally associated with profuse perspiration and nycturia, may present itself in the early stages of uremia. In advanced uremia the opposite extreme—dryness of the mouth and pharynx with the production of a tenacious phlegm in mouth, larynx, pharynx, trachea, bronchi—is common. Whether a peripheral noxa to chorda tympani or a central lesion (to both nuclei salivatorii or to the hyptothalamus) is the underlying cause is difficult to determine, although the central origin seems more probable.

Bradycardia together with headache and oliguria attend cases of acute nephritis. In the uremic it is combined with bradypnea or with Cheyne-Stokes respiration, the apneic phase showing a definite lowering of the pulse rate. In these cases the vagus nucleus is obviously subject either to increased intracranial pressure or to a "toxic" agent. Later, when the heart fails, bradycardia is replaced by tachycardia.

Miosis due to parasympathetic stimulation is an obligatory sign of true uremia, whereas eclampsia is usually attended by mydriasis. Miosis seldom changes to mydriasis in ultimis. It is the medulla oblongata as well as the medial ventral nucleus of the thalamus which determines the width of the pupils (22).

Singultus, nausea, retching, and vomiting are often the dominating signs of uremia. It is clear that these represent sympathetic as well as parasympathetic stimulation. The closure of the pylorus is mainly brought about by the sympathetic nerve, that of the cardia by the vagus. Uremic vomiting is not attended by bradycardia. Experimental stimulation of the lateral hypothalamus and of the corpora mamillaria produces retching and emesis. In place of constipation, so frequent a sign of acute nephritis, vagal hyperactivity, i.e., diarrhea, oc-

curs in chronic nephritis and uremia, reminding one of dysentery.

Polyuria, a compensatory mechanism, subsides in the terminal phase of chronic nephritis, at which time it is replaced by oliguria or anuria. (The reverse phenomenon—oliguria or anuria suddenly shifting to polyuria—occurs unexpectedly in nephrotic children.)

In some cases, uremic acidosis may prove uncontrollable, even after the administration of large amounts of alkali; in others, it may instantly shift to alkalosis and tetany.

The sleep-like, comatose state of the uremic may be considered a defense mechanism, for the inhibitory nervous influences (miosis, flabbiness of the muscles, slowness of voluntary motions, apathia) prevail. It is the reverse of Cannon's state of preparedness, induced by sympathetic hyper-activity. Somnolence may give way to restlessness. The first may be produced experimentally by stimulation to an area between the fasciculus Vicqu d'Azyr and Meynert's tract (22).

The shifting from one extreme to the other, as demonstrated above, is the sequel of an instability within the vegetative centers, which lose their ability to maintain harmony in the system during the advanced stages of uremia. To conclude:

1. The physiologic function of the kidney is influenced by the vegetative nerves.

2. Anatomic studies reveal a rich nerve supply to all parts of the kidney (capsule, pelvis, glomerulus, juxta-glomerular apparatus, tubuli, arteries). The nerve fibers, both sympathetic and parasympathetic, are connected to the ganglion renale, the sympathetic trunk, the vagus nerve, the diencephalon, and many other cerebral structures, and the medulla oblongata.

3. Nephritic uremia is always attended by nervous signs.

4. Autopsy of uremic patients discloses many organic changes of the nervous system.

5. Clinical signs of uremia cannot be explained by the morbid anatomy of the kidneys.

6. Numerous "renal" signs are not confined to uremia.

7. Vegetative nervous signs are a constant and important feature of uremia. They occur mainly in the diencephalon. Clinical studies reveal that a damage to the diencephalon, i.e., to the regulator of the elementary vegetative functions (such as temperatures, water metabolism, sleep, etc.) is an essential pathogenetic factor.

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CARDIOSPASM AND GASTROSPASM

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Introduction

Idiopathic dilatation of the esophagus (cardiospasm of von Mikulicz; achalasia of the cardia of Hurst) has been for years a controversial problem. Its analysis and that of gastrospasm in the light of modern physiology and pharmacology and an attempt at elucidating the relationship of both diseases to the vegetative nervous system will be briefly given, based on the observation of seven cases.

Outline of the Clinical Signs of Esophageal Dilatation

The even dilatation of the esophageal tube with a smooth, symmetrical, tapering cone at the hiatus diaphragmaticus on X-ray studies, dysphagia of solid and liquid food with occasional regurgitation of anacid contents along with a moderate substernal discomfort constitute the main features of "cardiospasm." It may be permanent for a period of months or years (in one of my cases for more than 15 years); more often it is intermittent for a shorter or longer time. If congenital it may pass asymptomatic for years, until, after a trauma to the chest, or after a profound emotion, it abruptly starts producing clinical signs. Weight loss is in some instances considerable. In the case mentioned above, that of a 38-year-old man, culminating in marked dehydration and cachexia, reminding one of the cachexia with advanced organic lesions within the gastro-intestinal tract, or of the extreme cachexia with Simmond's disease or the cachexia of the marantic type of tabes dorsalis. As mental depression, listlessness, anxiety and disturbances of sleep are common with these patients, the clinical impression may also be similar to that of melancholy in manic-depressive psychoses. The pulse rate is apt to be high (92 to 96). There are no remarkable changes during the 24-hour cycle. Changes of the position or pressure upon the eyeball do not influence the pulse rate. The pulse is rhythmic. Exceptionally rhythmic bradycardia (52 to 56 pulses) was noted as a permanent feature. In these—rare—cases, pressure upon the bulbi would lower the pulse rate (to 36 to 40). In the bradycardic cases, representing apparently a special category, the breathing was irregular, in that longer intervals of apnea. were observed (Biot's respiration), whereas in the tachycardic group the breathing was found to be regular and of normal frequency (ranging from 16 to 24 p.m.). It was amazing to note that bradycardia and irregular breathing were occasionally coupled with areflexia of knee and ankle tendons. That fact will be discussed later. The bowels were mostly constipated. On passing a soft tube down the esophagus, sometimes an obstacle was felt on the terminal esophagus, where the patients felt the stopping of the food, which easily could be overcome. On some days it was not noticeable at all. Evidently we were confronted with a non-organic "functional" narrowing of the lowermost esophagus. In two of my cases the tube always entered the stomach with ease, yet the patients were not able to swallow. Once the tube had entered the stomach, gastric contents would regurgitate through the tube as well outside. Some of the patients were able to force the food down in a certain position or by forced respiration with the chin bent to the chest.

Coughing spells during the night were often complained of by the patients.

The patients were youthful or of middle age (from 18 to 51 years), males and females. Pylorospasm of the infants is known to occur more often in boys. The body-build was four times that of Stiller.

It might not be amiss to mention at this point a condition quite opposite to that under discussion: the esophagospasm with intermittent narrowing of its lumen at any level above the cardiac end. This condition is often due to nervous influences, although local anatomic changes may also give rise to spasm. This nervous type of esophagospasm is more often

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attended by bradycardia than is cardiospasm. Ptyalism is another feature of esophagospasm, contrasting to the dryness of skin and of the mucous membranes with cardiospasm. Esophagospasm may furthermore be attended by bronchospasm or urinary retention (16). I could however see attacks of esophagospasm associated with paroxysmal tachycardia, pallor of the face and neck, profuse perspiration, pains to the epigastrium and anxiety. In two cases of intermittent esophagospasm there were signs of lues (positive Hinton of the spinal fluid, positive Pandy, pleocytosis). After treatment, and reversal of the pathologic liquor to the normal, the esophagospasm cleared. Intermittent esophagospasm may be seen with tetanus and with hydrophobia. These facts, with the occurrence of paroxysmal tachycardia in Friedreich's disease combined with vomiting, irregularity of breathing and impaired deglutition, provide an indirect hint that a nervous, central factor, i.e. an irritation to the nucleus of the vagus nerve, may be operative in this condition.

Paralysis of the vagus trunk is on the other hand evidently an important factor in dilatation of the esophagus. In a male patient, 35 years of age, complaining of belching, vomiting after meals, and of painless dysphagia, F. Kraus observed, grossly and on microscopic studies, atrophy of both vagi (more on the left side) due to pressure by surrounding cicatricial tissue upon the vagi. The esophagus was found enormously dilated post mortem. In another case of uncontrollable dilatation of the esophagus, Hejrovsky and Marburg also noticed bilateral atrophy of the vagi trunks. In a patient, from whom one year previously a large portion of the stomach and both vagi had been removed below the diaphragm, M. Cohen reported a circumscribed dilatation of the terminal esophagus. Knight found after bilateral vagotomy a dilatation of the esophagus; the cardia, however, was not relaxed.

From this preliminary review we may infer, with due precaution, that lesion of both the vagus trunks is operative in the genesis of certain cases of idiopathic dilatation of the esophagus.

Anatomical and X-ray Studies

It might be well to recall briefly that the esophagus is innervated by the vagus from the n. laryng. inf. The vagus stimulates the contraction and increases the tone of its muscles. As a rule, from the right stellate ganglion one big or a few delicate grey fibers carry sympathetic fibers. In addition, sympathetic fibers course to the esophagus from the thoracic portion of the sympathetic trunk. The sympathetic fibers are inhibitors of the muscles. Between the longitudinal and the circular muscle layer and beneath the mucous membrane a network of nerve fibers and many multipolar ganglion cells are a regular finding. The vagus fibers are likely to constitute the preganglionic fibers of the beforementioned ganglion cells (R. Greving). Furthermore, a certain automaticity has been demonstrated by Prakken's investigations. Deglutition and peristalsis are dependent upon a "center" in the medulla oblongata lateral to and above the ala cinerea. This "center" is connected with terminal fibers of the vagi and with the nucleus ambiguus, the motor nucleus of the vagus. The esophagus is connected by smooth muscle fibers with the left main bronchus (m. pleuro- and bronchoesophageus, Hyrtl). This is interesting from the clinical standpoint.

On autopsy the entire esophagus is found to be either cylindric or spindle-shaped, rarely bottle-shaped, with the greater diameter upon the diaphragm. In the circumscribed type the dilatation is confined to the lowermost end, above or below the diaphragm. The musculature is markedly thickened in some instances—particularly so in Rokitanski's famed case, which I had the opportunity to study in the Viennese Institute of Pathology. The mucosa may contain, as in this case, dilated veins or epithelial changes with shallow ulcers. In some instances, as Hurst noted and as Rokitanski already knew, the dilated esophagus is thin-walled and flabby. In the category with muscular hypertrophy. throughout the entire organ, long-standing achalasia of the cardia and regurgitation may be the cause of hypertrophy. This type may be likened to Hirschsprung's dilatatio and hypertrophy coli congenita merely from the descrip-

tive viewpoint, i.e., to a congenital anomaly of the gastrointestinal tract. In later stages the esophagus may be lengthened as can be seen by fluoroscopy (Feldmann) and post mortem.

Templeton's recent X-ray studies have shown that there is not only a dilatation but also a profound derangement of the motility. His interesting findings have been confirmed by Ingelfinger.

On fluoroscopy, with the use of balloon-kymograph records, the tone of the wall was found to be depressed. No propulsion of the balloons in any part of the esophagus could be seen. The wave pattern of the peristalsis was irregular, with considerable fluctuations in intensity. It therefore seems safe to assume that we are dealing with a motor disorder, which belongs in our opinion to the large category of motor anomaly of the intestines to be summarized under the heading of dyskinesia and dystonia gastrointestinalis.

Our conclusion is this: idiopathic dilatation of the esophagus is a motor derangement belonging to the category of dyskinesia or, as I would prefer to say, to *Dysergia intestinalis,"* occasionally attended by muscular hypertrophy. The asthenic body-build seems to be predisposed, with gastrointestinal spasticity and atonia being a common feature of this structural anomaly.

Pathogenesis of Esophageal Dilatation

What is the biological significance of this disorder? What is the mechanism of its origin?

According to a general law of visceral innervation, four elements are concerned with the activity of all the inner organs: three nervous factors *sensu stricto* (the vagus, the sympathicus, the intramural plexuses and ganglia) and the automaticity of the viscus itself. It is the harmonious interplay of all these factors that provides for the "normal" functioning. "Dysergia" is the expression of a functional disorder brought about by the predominance or the lowered function of one of the four agents. As for the automaticity, little is known.

That the disorder of the innervation in certain instances of dilatation of the esophagus is due to a lack of activity of the vagus nerve may be deduced from the following facts:

1. In some cases, as was mentioned in the introduction, the vagus fibers were atrophic or the vagi had been severed.

2. Important evidence has been given by Ingelfinger's experimental work. By the use of Mecholyl a remarkable change of the motility took place. The esophagus, which originally was hypotonic and inactive, contracted vigorously and forced the air out of the recording balloons. Under the fluoroscope a violent contraction could be visualized. This is in accord with my personal experience that atropine, the antoganist of Mecholyl, in small and in large dose, was entirely ineffective. By my use of pilocarpine, salivation and perspiration could be produced, but no relief of the clinical signs. It is essential to keep in mind that both tone and motility of the esophagus are dependent upon the vagus and sympathetic influences. Both are intimately connected. Both are—at least temporarily—increased by Mecholyl.

3. There is always a lack of free hydrochloric acid in the vomitus of these patients.

4. In animal experiments Hofer has shown that, after bilateral section of the cervical sympathetic trunk, of the ganglia stellata and of the splanchnic fibers, the motor activity of the esophagus was practically not altered at all. After bilateral vagotomy, however, the esophagus was enormously dilated and atonic. On X-ray studies the cardia was closed. A few days later a certain automaticity of the lowermost esophagus was noticeable.

5. By analogy I want to mention a case of pylorospasm to be discussed in the next article: Spasticity to the pylorus without any organic lesion. Post mortem revealed destructive lesion of the nucleus dorsalis n. vagi, resulting in hyperactivity of the antagonistic sympathicus with firm closure of the pylorus. The pylorospasm in that case is analogous to the cardiospasm under discussion.

We infer that in some instances of dilatation of the esophagus the lack of vagal activity constitutes a causative factor. The question may now be raised: Where in the pathways of the vegetative nerves is the site of the lesion to be searched for? An answer to that question will be given in the following section.

Gastrospasm

Studies on the innervation of the visceral organs provide ample evidence that *organic*

diseases of the central nervous system are not seldom attended by abnormal motor phenomena in the vegetative sphere (11) of stomach and intestines. Confining our discussions in these papers to the stomach, we want to recall that *tonic contracture of the entire stomach—gastrospasmus totalis*—has been observed by us in cases of *tumor cerebri, parkinsonism, multiple sclerosis.*

In a case of tumor of the right frontal lobe (posterior third part of the first and second frontal gyrus) on fluoroscopy—for a period of about half an hour—the entire musculature of the stomach distal from the fundus was seen to be firmly contracted. During the time of observation there was no peristalsis visible. Local "peripheral" pathology (ulcus ventriculi or duodeni, tumor, perigastric adhesions, cholelithiasis) could be ruled out, as well as the other well-known factors producing spasticity of the stomach, such as morphia-abuse, saturnism, uremia, tetany, tabes dorsalis. There was no reason to suggest any involvement of the extragastric nerve-trunks. We consequently were driven to the conclusion that in that case *the cause was to be searched for somewhere in the central portion of the vegetative nerves.*

Akinesia, as might be mentioned in passing, is not uncommon in diseases of the frontal lobe. It concerns the striated muscles of the skeleton and not the smooth muscles of the inner organs. But did not the physiologists prove (1) that after stimulation of the anterior part of the sigmoid gyrus in the dog the rhythmic pyloric contraction altogether ceased and that simultaneously the wall of the entire stomach became contracted? These cortical centers of gastric motility may, by way of cortico-bulbar fibers (frontal lobe—nucleus dorsalis nervi vagi), or by way of cortico-thalamic and cortico-pallidal striation, exert their influence upon the gastric motility.

From the clinical point of view, anomalies of the gastro-intestinal tract under psychic influences (anorexia, vomiting, diarrhea, constipation) are well known. In studies on manic-depressive patients (7), particularly in the depressive stage, weight loss along with anorexia and obstinate, spastic constipation were a frequent feature. Pawlow's famed investigations on conditioned reflexes and the clinical experiments of Heyer on the influence of hypnosis on the function of the viscera have broadened our knowledge of psycho-vegetative relations. Since Monakow demonstrated that after destruction of frontal and basal temporal gyri degenerative changes take place within the globus pallidus, the great inhibitor of muscular activity, evidence of a frontal-pallidal connection has been established. A lesion in the frontal area of our patient may be the background of the gastric hypertonicity and immobility.

In cases of parkinsonism, Hess and Faltitschek noticed inhibition of the gastric peristalsis, lasting for one whole hour. After a short interruption, during which by fluoroscopy normal peristalsis could be visualized, there followed another period of complete aperistalsis. This period was attended, as the morphologic changes of the silhouette demonstrated, by some contractions of the stomach.

In order to understand these observations we want to recall two phenomena analogous with parkinsonism: the occurrence of urinary retention and the transitory absolute pupillary areflexia (24). This later fact can be accounted for only by transitory changes in the tone of the iris muscle, which probably is related to anatomic alterations of the striatum. It is needless to recall that both the bladder and the iris muscles are innervated by vegetative fibers. Three disorders in the vegetative sphere, we may conclude, may attend the parkinsonism: disorders of the stomach, of the bladder, and of the iris. By Hohman's investigations we have learned that parkinsonism frequently involves the cortico-thalmic radiation. The parkinsonism gastrospasm may therefore be explained on the same basis as the gastrospasm with frontal tumor. Modern studies, moreover, have proved that impulses to the gastrointestinal tract may also originate from the subthalamic area. This region is a frequent site of destruction in parkinsonism.

With multiple sclerosis motor disorders of the intestines are of frequent occurrence (11). In the stomach, episodes of aperistalsis have been reported by these writers. During these episodes the stomach appeared to be small, narrowed, due to constriction of both the circular and the oblique fibers. That the longitudinal fibers were involved simultaneously, could be

surmised from the lengthening of the organ. The pylorus remained closed during the time of spasm. Conversely, with the gastrospasm attending duodenal ulcers or attacks of cholelithiasis, "spastic" incontinence of the pylorus was noticed. By the time of maximal tonus the peristalsis stopped. The peristalsis, as the physiologists have shown, presupposes an optimum of tone. Maximal tonicity interferes with peristalsis. Maximal tonicity combined with aperistalsis are painless.

Holzknecht and Luger in their investigations on gastrospasm differentiated three types: the local, the regional and the total. This differentiation will be leading in the following discussion. From the very beginning we want to emphasize: 1) It is possible that there are transitional conditions between total gastrospasm and the hypertonic stomach ("Stierhornform"). Yet total gastrospasm is in any case associated with aperistalsis. 2) The hypertonic stomach is characterized by the increased tone of the entire musculature. Gastrospasm is most frequently localized and concerns the circular muscle fibers. Total gastrospasm is rather rare. It concerns the circular and the oblique and in certain instances also the longitudinal fibers.

Local Gastrospasm. It may concern the pylorus, the cardia, the greater curvature. Pylorospasm of infants will not be discussed in this paper. Pylorospasm of the adult is dependent upon: 1) localized, intragastric alterations (cauterization, submucous phlegmone, lues, localized hypertrophic gastritis?); 2) extragastric diseases (cholelithiasis, cholecystitis, duodenal ulcer, tumor of the flexura hepatica, nicotinism, tabes dorsalis, tetany, intoxication with morphia, uremia).

Regional Gastrospasm. There are reasons to believe that it is correlated to organic nervous lesions outside the stomach, in the medulla oblongata.

1. In one case, observed by Steindl and by myself, there was a tumor mass palpable in the pyloric area. On fluoroscopy exclusively the vertical portion of the stomach was filled with the opaque meal. On laparotomy a mass of the prepyloric area was removed with marked localized hypertrophy of the musculature, but neither ulcer nor tumor was detectable by microscopic study. In the nucleus dorsalis nervi vagi and in the medial part of the formatio reticulars there were destructive lesions of the ganglion cells, hemorrhages, round cell infiltration and glial production[2].

2. In one case, demonstrated by O. Porges, anorexia, vomiting and hyperperistalsis of the stomach were the main signs. Post mortem revealed a metastatic tumor to the left cerebellar hemisphere with destruction of the spinal root of the left acusticus and of the left corpus restiforme. The tumor extended mediad to the left nucleus dorsalis vagi and probably exerted pressure upon it. The stomach was normal except for hypertrophy of the pyloric-muscle. The primary tumor had been carcinoma mammae.

3. In hypertonic nephritis of long standing with uremia Ceelen reported organic lesions in the bulbus medullae oblongatae. It is possible that the spasm of the greater curvature 1½ hours post mortem in my case of uremia, without any lesion of the stomach and duodenum, was connected with an organic process within the oblongata. The problem of regional gastro-spasm requires further study in order to substantiate our suggestion.

In cases of local and regional gastrospasm atropine may bring about relief of the symptoms, indicating an involvement of the vagus.

Total Gastrospasm. It was reported for the first time by G. Schwarz[3]. It is dependent upon central nervous factors.

Total gastrospasm has been reported in: tetany (Schwarz and Falta), cholelithiasis (Schlesinger), gunshot and splanchnic irritation (Assmann) (very doubtful), hyperemesis gravidarum (Zehbe), morphinism with nicotinism (Zehbe) and the three cases, described by Hess and Faltitschek with organic diseases of the central nervous system.

As for tetany, there is no way of localizing the site of the nervous lesion. Schlesinger's and Assmann's cases do not permit any definite conclusion. With morphia and nicotine intoxication the involvement of a central factor is probable.

According to our observations total gastrospasm is characterized by: 1) its occurrence in

[2] Very similar is the case mentioned by Bockus.
[3] *Forbchritte der Röntgen Lochlen, 17:* 128, 1916.

episodes; 2) aperistalsis of the entire stomach; 3) the size of the stomach diminished or, in one of our cases, temporarily elongated; 4) closure of the pylorus throughout the episode (Schwarz however reported spastic opening of the pylorus); 5) lack of pain and lack of localized contracture of the abdominal wall and lack of localized hyperalgesia.

Cardiospasm

Let us now return to "cardiospasm." The outstanding feature, as was emphasized in the introduction, is the evendilation of the esophageal tube on fluoroscopy with complete lack of peristalsis or with a few, shallow peristaltic waves. Physical and closest neurological examination do not reveal any organic lesion. It is furthermore essential to remark that in the majority of instances the *entire* organ is involved. In that respect it reminds one of the gastrospasmus totalis. As the latter is dependent upon a central cerebral condition, we surmise *the idiopathic total dilatation of the esophagus to be likewise due to a central nervous factor.* Seldom we meet with a local widening and local atonia of the esophagus. This is not to be confused with a local diverticulum. Two types consequently are to de differentiated: 1) a localized one, evidently dependent upon a peripheral lesion of the vagi; 2) a total one, with lack of peristalsis and of tone throughout the entire esophagus. The onset of clinical signs is abrupt, as Rokitanski already remarked. It is practically painless and may pass unnoticed for a long period of time. It compares in that respect to the painless, total gastrospasm with organic nervous diseases. The discomfort and the burning sensation complained of by some patients, aside from the difficulty in swallowing, may be due to the epithelial lesions and the superficial ulcers secondary to the stasis of the ingesta. We should not forget that an optimum of tone is *conditio sine qua non* for peristalsis. Aperistalsis may be secondary to atonia. The atonia may be intermittent or, in final stages, permanent. It is noteworthy that, after an artificial opening between the stomach and the esophagus has been established, the esophagus remains unaltered, large, atonic and without any peristalsis (6). This is suggestive that some central agent is important.

Proper understanding of the idiopathic dilatation of the esophagus can be obtained by comparison to a similar syndrome.

Loss of muscle tone of the intestines, with sudden onset of meteorism, is known to occur with "neurotics," either "spontaneously" or following a shock or a trauma to the abdomen or after operations with anesthesia. This meteorism is usually attended by vegetative signs (extreme pallor of face and neck, vertigo, profuse perspiration, fall of blood pressure and tachycardia. Classic is Goltz's experiment: (blow to the abdomen, meteorism and standstill of the heart).

In gastric ulcers there are episodes of hypotonia of the gastric muscles and prolongation of the emptying time.

In narcolepsy we are dealing with attacks of sudden loss of muscle tone (arms, legs, head) along with pallor, weakness, tachycardia. This seems to be important, as narcolepsy in modern concept is connected with a lesion to the floor of the third ventricle or to the subthalamic area. From the latter stimuli to the gastrointestinal tract may originate. Conversely, catatonic seizures with increased tone are believed to be dependent upon stimuli to the infundibulum nearby.

In idiopathic esophageal dilatation all the muscles are atonic, the circular as well as the longitudinal. The latter fact is evidenced by the lengthening of the esophagus in advanced stages. Even in cases with the circular muscles hypertrophied, the lumen of the organ is dilated due to atonia. Mecholyl, which restores the tone, promoted at least temporarily the peristalsis in Ingelfinger's experiments.

In many of the cases the vegetative disturbance primarily and predominantly concerns the vagal mechanism. It can however not be ruled out that the atonia of the esophagus may originate from a primary hyperactivity of the sympathetic nerve, lowering by implication the antagonistic vagal impulses.

The site of the disease in any case is in our opinion to be supposed, outside the stomach and the esophagus, within the central portion of the vegetative system, since no peripheral pathology can be detected in these cases.

Pharmacological Remarks

The visceral organs, not only of the animals, but, as Hess and Faltitschek demonstrated, also

those of the humans are endowed with a certain degree of automaticity. This automaticity is subject first to the antagonistic influence of the vagus and sympathetic nerve and secondly to all the vegetative centers in the medulla oblongata, mesencephalon and cortex cerebri. The question to be answered is: What is the significance of the central vegetative structures?

By the use of certain drugs acting selectively upon the cortex (alcohol, paraldehyde) or on the midbrain (barbiturates), we are able to eliminate their function. In the first case, the mesencephalic and medullary centers and the automaticity are left, in the second only the medullary centers and the automaticity. In both cases the functioning of the stomach was found to be practically unaltered. The so-called "physiologic constants," e.g., blood sugar and blood pressure, were not markedly influenced. By administering certain drugs (atropine, adrenaline) we may in addition cause a vegetative imbalance. After the cortex had been functionally eliminated, this imbalance did not differ from the imbalance produced by atropine or adrenaline in the same patient, when the cortex was normally functioning. If, however, the midbrain was eliminated prior to the injection of atropine or of adrenaline, the vegetative imbalance underwent a profound change. The mesencephalon obviously is entrusted with a regulatory power, once the interplay of both the antagonizing nerves had been interfered with. The abrupt changes of temperature, the sudoral crises, anomalies of salivation, asthmatic attacks and rapid weight loss, which are known to occur with diseases of the midbrain are the clinical counterpart of these experiments. The amazingly vigorous effect of Mecholyl in cases of esophageal dilatation, reported by Ingelfinger, may be explained on the same basis: The Mecholyl effect was increased because the regulation by the vegetative centers was lacking. In a broader sense our observations mentioned above and Ingelfinger's studies may be summarized under "Cannon's Law." According to that law, after interruption of one link in a chain of neurons, an increased irritability of the isolated organ would arise.

After prolonged anesthesia, vomiting, constipation and meterorism are known to occur—even nervous ileus may be seen. W. Denk was startled by the fact that under spinal anesthesia the intestines sometimes appear to be stiff and contracted. This observation led G. Wagner, in a case of paralytic, nervous ileus, to use successfully a paravertebral injection of the appropriate level. It was the elimination of the sympathetic inhibitor influences by that injection that prompted the predominance of the vagus, thus immediately restoring the peristalsis to the normal. The maximal tonus of the intestines apparently interfered in that case with the motility of the bowels. Accordingly, in the case of "achalasia of the cardia," the use of spinal anesthesia restored occasionally the peristalsis of the esophagus and lowered the tension of the cardiamuscle. The use of this therapeutic procedure needs and deserves further study.

Comment

1. Idiopathic dilatation of the esophagus belongs to the large category of intestinal disorders to be summarized as "dysergia intestinalis." Atonia and aperistalsis are its main features. It is a nervous disorder involving, in the majority of instances, the entire esophagus with all its muscular layers. It is often attended by muscular hypertrophy. This type may be likened in some sense to Hirschsprung's disease (one of my cases was congenital). Exceptionally it is localized to the terminal esophagus and it seems possible that an originally local dilatation may finally become a total one. The site of the nervous disorder in total esophageal dilatation is the central portion of the vegetative nervous system above the deglutition center. The sudden onset of clinical signs, the association with psychic anomalies, with disturbances of sleep and with anxiety, the cachexia in advanced stages, the analogy to nervous esophagospasm and gastrospasm, the pharmacological studies, the involvement of the entire organ point to that direction.

The anatomic changes in the intramural plexuses, reported by Etzel, are inconstant and possibly secondary. These changes may account for the esophageal dilatation associated with megacolon, megaureter and bradycardia described by Etzel and apparently connected with vitamin deficiencies in certain areas of Brazil. The rare instances of dilatation of the esophagus coupled with bradycardia and areflexia

of the tendons, which I saw in Europe, constitute a special category.

2. Total gastrospasm is a motor disorder of the entire stomach. It is a central nervous condition. Hypertonicity and aperistalsis are the outstanding signs.

3. Both total esophageal dilatation and total gastrospasm are practically painless. This is—from the theoretical viewpoint—interesting.

4. Should the derangement of the tone be primary, both conditions might fall under a category of "diseases of the tone," arterial hypotonia and hypertonia with its well-known crises being the comparatively best-known representatives of that category. This is merely hypothetical.

5. The syndrome of tachycardia, constipation, achalasia of the cardia, anacidity of the gastric contents and the lack of response to atropine and pilocarpine gives at first glance the impression of a sympathotonic condition. Deeper investigation with the use of fluoroscopy and of Mecholyl, and the analogy to the gastrospasmus totalis lends support to a central lesion of the vegetative system. By this lesion the Mecholyl effect is greatly enhanced.

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THERAPY IN A STATE HOSPITAL REGRESSED WARD

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This paper is designed to describe what is being done as therapy in a state hospital ward of untidy, chronic, severely regressed psychotic patients. It is not offered as a model—limitations in funds, space, and personnel impose severe restrictions on any such ambitions; and it is not a controlled program such as the Stockton Pilot Study;[2] rather, it is offered as an example of what can be done in a practical way in an overcrowded, understaffed state hospital situation.

The patients dealt with in this paper are the most severely regressed in the Elgin State Hospital; they constitute the very lowest stratum of the hospital population for whom hope of recovery, at least in the mind of the psychiatrist, has virtually perished. Since therapy with the hope of recovery or at least of marginal extramural adjustment is unrealistic, the question arises as to the nature of therapeutic goals for these patients.

Since it is presumed that these patients will remain hospitalized, the aim of therapy may be considered as a better hospital adaptation. This would include improvement in toilet habits, decreased anti-social behavior, greater participation in recreational programs, greater participation in useful work.

These aims may appear very limited, indeed; but in an over-crowded, understaffed ward a decrease in anti-social tension and a greater cooperativeness among the patients has a strong effect on the group morale. The morale of the attendants must be considered important, too, for it has its direct repercussions on the morale of the patients and on the kind of care they receive.

The Patients and Their Environment

The particular ward referred to in this paper has a male population of about 160. They live in a one-story cottage with two large sleeping-dormitories, a day room, a dining room, and a recreation room in the basement. There are usually one or two attendants, one or two recreational therapists, and one dining-room assistant on duty.

The patients are almost all between 20 and 40 years of age. Most of them are chronic schizophrenics; their original sub-type classification was usually hebephrenic type, but all types are represented. At present they all present a more or less hebephrenic picture. There are a few severely demented luetics, a few mental defectives with psychosis, and one cerebral palsy case who does not fit in on any other ward.

All of the patients are untidy in toilet habits with the exception of half a dozen so-called ward helpers. Two of these ward helpers have ground privileges and can be trusted to perform various errands, though they, too, are quite deteriorated mentally. The others help make beds and keep the cottage clean.

The schizophrenic patients we are dealing with have been on this ward an average of 8 years, and in a state hospital an average of 12 years. The degree of their untidiness varies, from a few who wet the bed at night only occasionally, to many who are untidy at night almost all the time and during the day occasionally, to those few who are untidy all the time, drol saliva over their clothes, and allow accumulation of nasal discharges. They all wear clothes to some degree: a few will not keep on more than their trousers, but most will wear in addition, a shirt, sox, shorts and shoes.

Many of the patients are mute, few will talk spontaneously and most of them talk very little. Some prefer to sit or lie down, others walk about restlessly. There is little apparent interpersonal contact among the patients. Very rarely will they speak to one another, although it is clear that they appreciate what goes on much more than is superficially evident. An exception to this general description is the small group of mental defectives with psychosis. Many of these patients are relatively outgoing and friendly.

[1] Formerly at Elgin State Hospital, Elgin, Illinois.
[2] Stockton Pilot Study, California Department of Mental Hygiene.

Some of the patients in best contact are among the untidiest. It is very strange to hear a patient say, "Doctor, I've been here five years already. I've got a wife and two children to support, they need me. Why can't I go home? I can always get a job"—and then to realize that this patient exercises no control whatever over his toilet habits. Of course, this is not the usual situation.

As a group, the patients present a rather chaotic picture. Especially before the present program was begun, the idleness, the empty, meaningless activity, the constant walking back and forth and milling about was very prominent. Also outstanding is the absence of any apparent group feeling; one senses immediately that there are 160 men together in the cottage, but with little sense of a community. Yet this is not entirely true. As a group they are very sensitive to distracting influences. Sometimes there are "bad mornings" when the routine does not go smoothly. Often this is true when there is a relief attendant who does not know the patients well. Sometimes a patient who is constantly shouting, or one who runs about incessantly, affects the others and seems to stimulate a general restlessness. It is at these times that fights usually break out, and there seems to be a vicious cycle leading to a decrease of morale, and a decrease of patience on the part of the attendants. On the other hand, "bath morning" is always calm, the sedative effect of the bath exerting a quieting effect with a resulting benign cycle. Thus the patients behave as a group, even without awareness of this feeling.

It is difficult to separate therapy for the group as a whole from individual therapy, since the individual here seems to be submerged to such an extent in the group.

Recreational Therapy

In the past few years a limited recreational program has been instituted. The basement is used for indoor activities such as small-scale ball games, Chinese checkers, jig-saw puzzles, an electric bowling alley, calisthenics, singing, and rhythm band. During the warm weather, the patients are taken for walks, play soft-ball, volleyball, croquet, and go on fishing trips. At the main recreation building they go roller skating, to movies, to concerts, and to weekly dances held especially for regressed patients, where they participate in simple group dances, rhythm games, and, to a certain extent, in ballroom dancing.

Not all the patients participate in all these activities. Some refuse blankly to go anywhere. Many will not keep on shoes, and cannot be taken on walks or to dances. Those who expose themselves cannot be taken to many activities.

In observing the patients at their recreational activities, it is not surprising that some participate as so many automatons. Many, however, do seem to enjoy what they do and are less mechanical in their participation. Many who are ordinarily untidy during the day will keep tidy while they attend these activities.

The day room is equipped with both radio and television, and all the patients, of course, are able to listen and watch. Nevertheless, it is rare for more than 4 or 5 patients of the 160 to watch television. It is difficult to assess just how much these activities mean to the patients. There is no question but that they enjoy them, and their life is made more pleasant. They also drain tensions and make the ward a much more tolerable place. But whether they counteract regression in these chronic patients is questionable.

Occupational Therapy

Facilities for occupational therapy are centered in the admitting building, and include the usual activities. Because of limited space and personnel, only a few patients from regressed wards can be accommodated. For over two years, two patients have been going regularly each morning, and have been working on wood crafts, sign lettering, and other very simple projects. Although untidy on the ward, these patients are always clean at the workshops. One of them talks in an aphasia-like word salad, but lately has been making requests in coherent language. This, however, is the limit of improvement noted. Here again, the value of this kind of activity cannot be disputed, but the therapeutic effects appear very slight for the amount of time invested.

Psychotherapy

No consistent, formal attempts at psychotherapy were made with these patients; how-

ever, the ward physician attempted to enter into some kind of relationship with as many patients as possible[3].

All patients who seemed at all receptive were greeted with a "Hello, Mr. ——." If they approached the physician, he talked to them in a friendly manner, and any questions were answered in as realistic a fashion as possible. If they acknowledged the "Hello," he would make a few comments of neutral interest. The most receptive patients were the mental defectives with psychosis. Almost immediately a strong relationship was established, and they would approach the physician with greetings, complaints about the other patients, apologies for having done something wrong, and similar personal items.

The routine mental and physical examinations, at which time one patient was seen alone in a separate room, provided a good opportunity for getting acquainted with each patient.

After several months, it was observed that some of the schizophrenic patients began to participate in a definite interpersonal relationship. Some of the mute ones began to proffer their hands for a handshake. Some of the paranoid ones, originally very hostile, began to mellow and converse with the physician.

After many months, the changes noted were hardly spectacular, however. The general atmosphere on the ward appeared friendlier, and there seemed to be more spontaneity among the patients. Beyond that, there was little change.

The most successful example of a patient whose condition possibly improved primarily from contact with the ward physician is described below:

M. L., 42 years old, has been in institutions on and off for 12 years, classified as Dementia Praecox, undetermined type. For the past two years he has been untidy. When first seen, he was so hostile and belligerent that a physical examination was not attempted. His speech was filled with grandiose, paranoid and bizarre ideas: His mother was a princess and he had been kidnapped and locked up with "hermaphrodites" and killed 100 times a day. An attempt was made to converse with him and reassure him about his safety. He gradually became more friendly, and soon began to inquire about going home. His conversation became less bizarre, and he became much more cooperative on the ward, actually helping the attendants with the chores—something he had rarely done before. He continued to be very untidy.

[3] The ward physician spends a few minutes to a few hours on this ward each day, depending on the demands of other work.

Attempts to improve the personal habits of the patients through suggestion and encouragement were without success. Of course, it was not possible to devote much time and consistency in this effort, and too much was not expected. But even patients in relatively good contact showed no alteration in their untidiness.

Electroconvulsive Therapy

By far the most remarkable results were achieved with the "shock" therapies, this in spite of the fact that *almost every schizophrenic patient had had several courses at some time in the past*. In many cases, the improvement following electroconvulsive therapy (ECT) was minimal, or short-lived; but several patients improved spectacularly, and one was restored to his pre-morbid state and discharged. In many instances, maintenance ECT served to keep a patient in an improved state when signs of beginning relapse were observed. Of course there were many failures, including those who were thought to be good candidates because of response to previous courses of ECT, and those who appeared to be poor candidates. On the whole, however, it was felt that even the improvement in the status of a few patients made the program of ECT well worthwhile.

The active therapy carried out on the ward had the effect also of improving the morale of patients and attendants. There was the feeling that something concrete was being done. One schizophrenic patient even approached the ward physician and asked if he could get treatment.

Although every patient on the ward is studied and his chart reviewed for consideration of ECT, patients who act out in anti-social ways, or are feeding problems, come first to the attention of the physician, as there is more urgency to "do something." This is true of those who are destructive, or combative, or suicidal, or who annoy other patients to the point of desperation by noisiness or by constant hyperactivity.

The following case showed the most dramatic improvement following ECT:

R. B., age 39, has had 7 admissions since 1931,

when he was 18 years old. His first admission was occasioned by a period of restlessness and erratic behavior. Apparently his early development had been uneventful, and he had been considered congenial, an easy mixer, with many friends, though shy with the opposite sex. He was discharged two months later against medical advice, diagnosed as Dementia Praecox. He seemed completely recovered, however, and worked successfully for seven years. He then had another psychotic episode, and was again hospitalized, diagnosed as Dementia Praecox, undetermined type. He was treated with insulin coma, and was discharged as much improved after 6 months. He continued to be in and out of the hospital, receiving insulin on each admission with progressively less effect.

At the time of his most recent admission in 1951, he was described as confused, circumstantial, disoriented and preoccupied. His behavior was surly and facetious. He soon became untidy in toilet habits, and extremely combative, necessitating hydrotherapy much of the time. When interviewed a year later, he was untidy, hostile, and belligerent, spoke in an affectless monotone, with extremely bizarre stream of speech.

He was given three ECT, with a complete and remarkable transformation to a neat, polite, outgoing man, who showed no overt signs of psychosis. He was discharged, and has been followed as an out-patient for eighteen months, with no signs of relapse.

Of course, this is an unusual case, and such spectacular results are totally unexpected. In retrospect, one might suspect from the history that he would have been amenable to ECT, but unfortunately his untidiness classified him on a regressed ward on which there had been no active treatment program.

The next few cases demonstrate significant improvements with ECT, especially using maintenance treatments periodically:

H. R., age 32, was first admitted in 1935, diagnosed as Manic-Depressive Psychosis, Manic Type. He received Metrazol treatment with little benefit. Three years later he was becoming depressed, but was also showing signs of schizophrenia. He became untidy of toilet habits at about this time. As the years progressed it became obvious that he was suffering from schizophrenia, hebephrenic type, and not manic-depressive psychosis. He was very combative and destructive, and spent much of his time on the acutely disturbed ward.

He was given 8 ECT at semi-weekly intervals, and became much more cooperative, was in better contact, was not combative, and became fairly tidy. Though still quite regressed, he was now able to participate in recreational activities and was much easier to manage.

R. C., age 23, has been in the hospital 4½ years. He was classified as Dementia Praecox, undetermined type. When first admitted, he was confused, retarded but coherent. He was given 10 ECT with no observable improvement. In the ensuing year he became untidy, much less in contact, and rambled incoherently. He talked to his dead brother over an imaginary telephone in a loud, monotonous voice, which was maddening to listen to hour after hour. He ate very poorly.

He was then given another course of 10 ECT, following which he was in much better contact, quiet, coherent, cleaner, and had a much better appetite. After about a month he began to slip back, and was given maintenance ECT about once a month. He continues much improved, and is only rarely untidy, over a period of two years.

R. M., age 48, was first hospitalized in 1919 at the age of 16, with a history of having exposed himself and masturbated in public. He was diagnosed then as Hebephrenic Dementia Praecox. He was discharged a year later, improved, and was able to hold a job for three years. Then he began to change jobs frequently, heard voices, and was recommitted. He made a good institutional adjustment until his discharge in 1943. He again was able to work for three years, but began to masturbate in public once more and was returned for his third and present admission. Two years ago he became untidy in toilet habits, and was quite combative, so that he spent most of his time on the acutely disturbed ward. He had had several courses of ECT in the past, and was described as somewhat improved following each course.

When interviewed in 1952, he appeared pleasant and agreeable, was oriented, but showed poor social comprehension and was occasionally incoherent. A letter written to his father was observed to be entirely bizarre and unintelligible. Following 10 ECT, he became very cooperative, was not combative, spoke entirely coherently, and was observed to write a perfectly rational and coherent letter to his father. He was so much better that he was industrialized on the lawn detail. After about 6 weeks he began to relapse, and was given maintenance ECT—about three every four weeks. He has continued to be tidy and cooperative though he has not always been well enough to work on the lawn. He does, however, work conscientiously on the ward. He has had occasional periods of confusion, which seemed to clear spontaneously. Even when confused, he is in much better contact than he was before treatment, and has not been untidy or combative over a period of two years.

C. J., age 23, has been hospitalized 3 years, classified as Dementia Praecox, undetermined type. He had adjusted poorly at school and in the Navy, from which he was dishonorably discharged. He then lost interest in his environment, drank a great deal, and was committed. He was given 10 ETC and was reported questionably improved, but could not be made to accept any industrial assignment.

When seen in January of 1952, he appeared in good contact but without much affect. He was destructive of clothing, noisy, and untidy of toilet habits. Another course of ECT was given and, after the first treatment, it was observed that he attended recreational activity for the first time. After 8 treatments he was considerably improved—well behaved, quiet, and tidy. He was industrialized on the lawn detail, but was never a good worker. He walked off one day and since then he has had a tendency to escape. In the two years following treatment he has largely maintained his improvement except for occasional incontinence at night. He has been given 3 maintenance ECT about every 8 weeks.

A. S., age 35, was admitted at the age of 22 with the diagnosis of Dementia Praecox, undetermined type. He was treated with insulin coma, but was unimproved. He rapidly deteriorated and was soon untidy in toilet habits. He had a passion for tearing up clothing and bed sheets, and was extremely trying to the attendants and to the other patients, who would attack him for stealing their clothing. He also continuously searched the floor for scraps of paper which he would collect, and would annoy the other patients with his hyperactivity.

After 7 ECT he improved remarkably. He was quiet, did not tear his clothing, attended recreation, and was altogether a different person. He was not entirely tidy, however. After two weeks he showed some restlessness and signs of returning to his old behavior, and was given one ECT. This has been repeated about every 2 weeks, and he has continued to maintain his improvement over a period of two years.

Several patients who ordinarily required tube feeding because of refusal to eat, have been given maintenance ECT with sufficient improvement that they eat adequately without special feeding methods.

The following two cases are typical of treatment failures. In addition there are many patients who improved transiently but relapsed within a few days so that even maintenance treatment could never catch up with the tendency to relapse:

W. M., 34 years old, has been hospitalized for 8 years, classified as Dementia Praecox, Hebephrenic type. For 6 years he has been on the untidy ward, although he wets himself only at night. He had been given ECT at a private hospital prior to commitment, without any apparent benefit. In 1952 he was reported as mumbling unintelligibly in an affectless voice, repeating endlessly the same phrases. He was given 4 ECT without any change whatsoever; it was therefore discontinued.

G. S., age 37, has been hospitalized for 5 years, originally classified as undiagnosed psychosis, later revised to Dementia Praecox, undertemined type. He had had ECT at a private sanitarium, with no effect. On admission he appeared depressed, admitted hearing voices, and was preoccupied, but would not discuss his feelings. He was given a course of insulin coma treatment, with little improvement, and he began to deteriorate rapidly.

Three years later he became moderately untidy in toilet habits, and would not wear more than his trousers. If coaxed to wear a shirt, he would stuff it in the toilet bowl. He seemed depressed, and frequently broke windows and attempted suicide, which he ascribed to "despair, I guess."

An effort was made to encourage him in his personal habits, but he never made any real effort. Because of his depression, it was thought he would benefit from ECT. After 6 treatments, however, there was no perceptible change.

Other Therapies

Hydrotherapy is not adminisitered on the ward, but at a separate unit. Patients who become acutely agitated are sent to this unit for packs and tubs in the usual fashion.

Psychosurgery has not been employed, partly because the program of psychosurgery at this hospital is in its early stage of development, partly because this class of patients offers the poorest outlook for improvement with lobotomy and related techniques.

Discussion

Although ideally, a "total push" program for chronic regressed schizophrenic patients would be expected to achieve the most worthwhile results, such a program cannot yet be practical except on an experimental basis. The clinical impression that the great majority of these patients will not get well, no matter what the treatment, may not be valid; yet within the realm of ordinary state hospital facilities it remains an inevitable fact.

It is remarkable how many isolated areas of contact these patients have, and equally remarkable how isolated these areas remain. ECT has been found to have an effect in some patients of broadening areas of contact, especially when a slight improvement may mean a great deal, such as a change from untidiness to tidiness in toilet habits—this in spite of the fact that these patients have almost all had several courses of ECT or insulin coma previously, either with no improvement or rapid relapse.

Recreational therapy has been found important in releasing accumulated tensions; this can

best be demonstrated by comparing the restlessness of the patients on Sundays, when there is no recreational program, with their behavior on weekdays. It does not produce any results which compare in intensity with ECT, however.

The fact that one patient was able to be discharged because of an ECT program on a chronic ward is extremely encouraging. Other patients, whose anti-social behavior was a source of desperation to the other patients and attendants, improved remarkably under ECT, with the result that the ward became a much more tolerable place in which to live and work. Still other patients, previously idle, came into better contact, and could be industrialized as ward helpers.

It is evident that the improvement can better be assessed in terms of the total group than in terms of the individual patients. One can presume that a patient who is combative is less at peace with himself than one who amicably follows the routine; yet it is really impossible to assess, and there are no criteria for validating, the ego functioning of these severely regressed patients.

The improvement in the patients was paralleled by an increase in the morale of the attendants, who were quick to sense the slightest advances made by the patients, and were more accepting of the difficult ones when they knew that something active was being done for them. The recreational therapists were pleased, too, when patients who had been immune to their efforts to get them to attend recreational activities were now willing to participate, and when those who had been willing to participate were now anxious to do so. Both the attendants and the recreational therapists tended to confirm the impression that the ward had become a little less chaotic, and considerably more manageable.

Maintenance ECT was found very effective for certain patients. Whether they will eventually become refractory to ECT cannot be ascertained yet, but after two years there is no indication that this will be the case.

The question of what permanent damage results from prolonged ECT cannot be legitimately considered a factor in the question of treatment for these patients, for they are so demented functionally that any organic impairment is an insignificant part of their total incapacity.

It should be emphasized at this point that the patients referred to in this paper are chronic and regressed, and the comments are in no way offered as applicable to acute or well preserved schizophrenics.

Summary

In a male ward of 160 chronic, regressed, untidy patients, most of them schizophrenics, an active program of recreational therapy and electroconvulsive therapy was instituted.

The recreational program has been found valuable in releasing tensions, and making life more enjoyable for the patients.

Although almost all the patients treated with electric shock had had previous courses, usually with little or short-lived benefit, several patients showed a good response to further treatment. One patient was discharged as recovered, two were industrialized outside the ward for a time, and several were industrialized as ward helpers. Many untidy patients became tidy or at least tidier in personal habits. Several chronically anti-social patients showed marked improvement in their behavior.

Maintenance electroconvulsive therapy was found effective in many patients in keeping them at an improved level.

HUGHLINGS JACKSON'S DOCTRINE OF CONSCIOUSNESS
Sources, Versions and Elaborations

WALTHER RIESE, M.D.

The Philosophical Background of Modern Neurology

Men of science endeavor to reach humanity as a whole. Yet regional differences in tradition and education must be admitted among those countless factors which always contribute to the birth of an idea—though the claim of any great truth as a national property suggests a nation's weakness rather than its strength. With these restrictions in mind, one may venture the statement that the doctrine of nervous function drew primarily from only two national sources. Two great ideas alone have shaped contemporary neurology: the doctrines known as *Cartesianism* and *Evolutionism.* Neurology, embodying these two doctrines, reflects the major developments which human thought has undergone in previous centuries. The Cartesian doctrine provided the first discipline and energy of modern scientific method and thought, which still remain indebted to it in spite of the resistance and, at times, violent reaction of certain contemporary thinkers. Cartesianism influenced the structure of neurology mainly in France and those countries which adopted French thought and tradition. Evolutionary thought took its final shape in Great Britain. It is among the frequent paradoxes in human history that the awakening and first versions of evolutionary thought remain linked with the names of eminent French naturalists, Geoffroy St. Hilaire and Lamarck. These names, it is true, should not be mentioned without including their German contemporaries, Goethe, K. E. von Baer, Meckel, Kielmeyer, et al. Cartesianism fell into disrepute because it allegedly implied a *mechanical* concept of vital phenomena. It is true that in the Cartesian design of the body-machine none other than mechanical forces were admitted. The soul, evidently a supra-mechanical factor using for its own purposes the finished machine, was not introduced until the description of the body-machine was completed. But those who dislike easy formulas and quick generalizations will not deny that a mechanical element is often found in evolutionary thought. C. von Monakow stressed this infirmity in Spencer's evolutionism. Conversely, the general idea of evolution and development and, more specifically, its usefulness as a method of research did not escape Descartes who wrote in his *Discours sur la méthode* that the nature of material things is much easier to understand by seeing them grow than by studying them in their finished state (". . . *bien plus aisée à concevoir lorsqu'on les voit naître peu à peu en cette sorte que lorsqu'on les considère que toutes faites*"). Moreover, the fact that Descartes devoted one of his works to the description of the human embryo testifies to the great interest he took in individual evolution.

There remains, of course, that element so significant of evolutionary thought (but hardly compatible with the Cartesian design of the body-machine), namely the idea of the natural *origin,* the *variations* and the *hierarchy* of organized beings. It is true that we do not find that each of the different versions of evolutionary thought contains each of these three constituents. But in Cartesian thought the body-machine, once formed, remained forever what it was. The idea of creation, which cannot be isolated from Cartesian thought, did not seem to admit of a *variation* of created beings which thus emerged as *constant* ones. In the famous discussion which took place in 1832 at the French Royal Academy of Science, and which Goethe believed to be of more far reaching importance than the political upheaval, Cuvier realized, not without great concern, that the new threat to the idea of constancy was linked with a threat to the idea of *creation.* But his great opponent Geoffroy St. Hilaire by no means proclaimed atheistic intentions. Our contemporaries may remember the more recent polemics in the battle of ideas between "creationists" and "evolutionists." The whole subject underlying the polemics is not out of place in a critical study of evolutionary thought in

the doctrine of nervous function, since Hughlings Jackson confessed: "The evolutionist does not invoke supra-natural agency" (6, II, p. 84). This statement was polemic and intended by Jackson to stress the difference between the doctrine of concomitance and Leibniz's "two clock theory" with which the former had been identified by one of Jackson's critics. It seems indicated to re-quote Fiske's statement, quoted by Jackson in 1887, to bring into relief his own stand:

> "The assertion of the evolutionist is purely historical in its import, and includes no hypothesis whatever as to the ultimate origin of consciousness; least of all is it intended to imply that consciousness was evolved from matter" (*Darwinism and other Essays,* p. 67).

The general ideas of Hughlings Jackson's doctrine and their implications in his design of the nervous system were traced by this writer in his *Principles of Neurology in the Light of History and Their Present Use* (9). The following quotation is from Henry Head's paper, *Some Principles of Neurology,* published almost 40 years ago (4). The passage has lost nothing of its significance and the call for a reutrn to physiological discipline seems as timely today as it was in 1918.

> "The English school has always been essentially physiological, from the days of Marshall Hall onwards; but this growing attention to function is mainly due to the teaching of Hughlings Jackson. He sprang from the physiologists of the middle of the last century, and was deeply imbued with the principle of evolution, not only of structure, but of function. But his contemporaries became increasingly obsessed with the study of anatomical and topographical details. As years passed by, the teaching of the day moved away from Jackson's conception of an evolution of function, still demonstrable in the activities of the nervous system. Finally his doctrines were scarcely comprehensible to those of us who were brought into daily contact with him in the wards, seduced as we were by the glib generalities of more popular teachers. But when we came to think for ourselves, we found that his conception of a functional hierarchy, in which one form of activity was dominated by another, standing higher in the evolutionary scale, explained much that was otherwise inexplicable in the phenomena of nervous disease. This swing-back to the physiological aspect was quickened by the exquisite researches of Sherrington, and the issue of his *Integrative Action of the Nervous System,* in 1906, marks an epoch in the progress of neurology."

The Jacksonian principle of evolution indeed implies a hierarchy of functional levels. Though the higher levels are understood to have evolved out of lower ones, this process is not discussed in terms of time or descent, but in those of regional modifications of a basic type of nervous function (coordination). These modifications or levels coexist *simultaneously* in the same individual. In this concept we find corroboration of the present writer's interpretation of nervous function as a form of *functional metamorphosis* (9, p. 46). Such an interpretation enables us to understand the way in which there may be provided a greater wealth of potentialities than could be associated with "species" or levels breaking away from lower ones and leaving them behind forever.

Cartesian Elements in Jackson's Doctrine

The most obvious Cartesian element in Jackson's doctrine of the evolution of nervous function is his sharp distinction between two basically different realities or "series," namely the physical and the psychical ones. Psychical states, he said, are "utterly different" from physical states. He even went so far as to consider the psychical "series" as an immaterial one (5). In the scientific investigation of nervous diseases, he considered it was essential to maintain a rigid distinction between psychology and physiology. He had been misled, he confessed, by not having appreciated this distinction between physical (nervous) states and psychical states in his earlier studies. Physical conditions, he continued, should be compared and contrasted only with physical conditions, and psychical conditions with psychical conditions. He accepted them as two *irreducible terms.* "There is no physiology of the mind any more than there is psychology of the nervous system" (6, I, p. 417).

Jackson was a physician and therefore trained in that medical thought which had, since the days of the renaissance, emphasized the anatomical constituent in the conception of disease (10), but he was also a neurologist influenced, perhaps unwittingly, by the tradition of the Edinburgh school and the sect of the "neuropathologists" which selected the nervous system as the source of animal life (7). Jackson was neither a "universalist" nor a "localist." He strove for an intelligible and

workable formula admitting of a satisfactory correlation of basic manifestations of animal life, i.e., movements, disturbed or not, with the nervous system. Movements were to him obviously physical states. Movements, he said, always arise from liberation of energy, and never from sensations or any other kind of states of consciousness (6, I, p. 367). Jackson, being gifted with a strong sense of purity of method, was most anxious to avoid any psychical qualifications of movements. Again and again, he strove for the best possible expression to substitute for the term "voluntary," conveying as it does an unmistakable psychical meaning. The new term, he felt, must be completely free from this connotation. The "least automatic" seemed a very appropriate term, rigidly equivalent (6, II, p. 68), he said, to what is called "most voluntary." It is tempting to suggest that the new term may have also recommended itself because it implied the principles of evolution and dissolution. It was, however, a negative term. Therefore, he would readily turn to "a high degree of speciality and independence" (6, II, p. 666) as a new criterion of movements previously called, in psychologic terms, voluntary.

As a logical consequence of the same principle, namely purity of method, Jackson naturally rejected the blending of *any* psychical term with physical ones such as active states of nerve structure, liberations of energy, or discharges. The evolutionist, we read in one of his footnotes, "does not try to localize volition or any other mental faculty in the brain" (6, II, p. 402, n. 2). He was concerned only to study not emotion, but its physical basis, i.e. "nervous arrangements of the highest centres especially *representing those parts of the body concerned in and as they are concerned in, the manifestations of that emotion*" (6, II, p. 160). One of his most significant and most impressive dicta was that he wanted "consciousness to be left alone." True, he did not cite the reasons for which he had to exclude it from his correlating efforts. We must presume that the reasons were self-evident to a nineteenth century physician with philosophical education and leanings. The correctness of this assumption may be questioned by Walshe's assertion that Jackson was "a man with no source of philosophical guidance or inspiration other than his own Victorian age so very meagrely provided . . ." (13). But granted that this was the situation Jackson had to face, he must still have been familiar with the fundamentals of the Cartesian teaching and the *non-spatial* nature of mental phenomena implied in this teaching. In brief, Jackson wanted only to deal with the highest cerebral centers as the *physical basis* of consciousness, mind or mentation, terms which he used synonymously. That there must be anatomic substrata of consciousness followed by necessity from his assumption that physical states always accompany psychical states or that both occur in parallel. He called it the "doctrine of concomitance." But he always strictly maintained firstly, that the physical state never changes into the psychical state, and secondly, that there is no interference one with the other (5). Consciousness, he concluded, only *attends* functioning of the brain.

Jackson's Doctrine of Consciousness

The admiration of Jackson's genius should not deter us from unmasking certain difficulties implied in his doctrine of consciousness. Jackson himself realized them to their full extent. No reader of his writings can escape the profound impression left by his never-ceasing striving for the best possible formula, his frequent retouches and corrections, his reductions and expansions, his willingness and ability to learn from his contemporaries and to draw from all sources, medical as well as philosophical.

What did Jackson understand by consciousness? What did he understand by anatomical substrata of consciousness? Consciousness represents, he said, or is, the whole person psychical (6, II, p. 54). The anatomical basis of consciousness represents the whole person physical, impressions and movements of all parts of the body. One may ask the following question: should the representing part itself not be included in the whole? Can we isolate, be it only by thought, one part of the body from the rest, which the part is supposed to represent? If the anatomical substrata of consciousness are "unifying or synthesizing centres" (6, II, p. 96), should they be left out of unification or synthesis? Or should we request for this action a still higher center, which

would again, call for yet another one? If these centers are a series of miniature highest centers, each in the same degree "potentially" the whole organism, though each "potentially" in a different degree and order of representation of all parts, which part is the anatomical substratum of the final unity of the *person?* The latter is an *absolute* unity, whereas physical unity is *relative.* Moreover, the unity of the individual is a unity in *action,* whereas the unity of the brain or its divisions is a unity in *space.*

It is for similar reasons that one may question the thesis that the physical basis of the *Time Constant* is of "nervous elements representing (re-representing) *some* rhythmically acting organ, and presumably the heart, the most rhythmically acting" (6, II, p. 111). The fallacious assumption implied in Jackson's thesis is that the frame of reference, the Time Constant, is believed to arise during the activity of the system referred to. We can conceive of no physical substratum which would not pre-suppose space and time as "subjective standards." Moreover, it is doubtful, to say the least, whether any physical rhythm could be adopted as more than a *comparative* constant. The absolute constant, namely a truly unchangeable frame of reference, remains an *ideal* one, and for this reason cannot be thought of as occurring in parallel with any *perceptible* structure or process. Though it is perfectly true that "evolution cannot get out of the body more than there is in it" (l. c.), it remains to be seen whether everything can be put into it.

In brief, *self-consciousness sets a limit to the principle of concomitance.* Jackson was a decided adherent of this principle, which he borrowed from Herbert Spencer, but which must, for its origin, be traced back to Leibniz. Jackson trusted that this principle would protect him against that neglect of the psychological aspect which was implied in the assumption that psychical states and physical ones are but "different sides of one thing." We may observe that this assumption is as popular in our time as it was in the days of Hughlings Jackson. He hoped that the same principle would also protect him against crude materialism which claimed to get mind "out of the body." But Jackson was emotionally unable to allow that pure chance determined the physical state accompanying a given psychical one. In fact, he strove for precise criteria of those anatomical substrata or levels of nervous activity which occur in parallel with corresponding psychical states and he decided to select the highest centers. But will any division of the brain ever be an *intelligible* concomitant with the unity of the person? A higher center, Jackson said, *is* nothing but a lower, or many lower "over again" in a more complex way, *is* the lower, "raised to a higher power" (6, II, p. 99, n. 3). It follows that by the increased number of the parts of the body represented (a purely *quantitative* criterion) the greater complexity and intricacy of representation can make the highest centers fit to serve as correlative physical states. Nevertheless, the passage from simple conscious states to the unity of the person or self-consciousness remains a *fundamental* one.

In 1874, Jackson postulated that the substrata of consciousness are double. He believed that by the nervous arrangements concerned in object consciousness (the right posterior and the left anterior lobes) we learn the nature and position of the object which affects us, while we learn by the nervous arrangements concerned in subject consciousness (the right anterior and the left posterior lobes) the manner in which and the position where our organism is affected. He believed also that the activity of the substrata of subject consciousness always precedes that of the substrata of object consciousness and that both activities are different from each other (6, I, p. 245). Again, he believed that the substrata of object consciousness are the higher of the two substrata. He chose as an example the "brilliancy" of the mentally over-fatigued "owing to an excitement of the substrata of subject consciousness *permitted by* slight and partial exhaustion of the substrata of object consciousness . . . loss of control." Compared with the final formula adopted in 1887, his thought definitely evolved towards a more sober and cautious expression. True, there still remained the precarious and *regional* difference between the anatomical substrata of subject consciousness and those of object consciousness. Jackson did not feel at ease when, in 1887, he rediscussed the subject. He found it necessary to make some significant qualifications, such

as "degrees of fixity of nervous arrangements," "temporary groupings"; obviously these qualifications were intended to deprive the anatomical substrata of consciousness of too rigid and too regional a character.

The remnants of his first version cannot obscure the greater scope of his later version. It is impossible, Jackson said in 1887, to speak of objective states of consciousness without implying subject consciousness. It would be better, he now said, to substitute consciousness of self for subject consciousness, better still, self-consciousness, and best of all, merely self. There are to be found in his "Remarks on Evolution and Dissolution of the Nervous System" (6, II, p. 93) numerous versions, in a non-technical language, of the *identity of the self in all his thought-processes.* Subject-consciousness was defined as a constant to object consciousness believed to be continually changing. The most resolute and far reaching statement was the following one, made, as frequently, in a footnote: "Strictly, of course 'I' covers both subject and object consciousness. It stands for a person" (l. c.).

When treating the "Factors of Insanities," he stated: "What we call external circumstances are perhaps artificially separated from 'local bodily states'" (6, II, p. 420). Evidently, the statement conveyed the idea that the body maintained a quasi *external* position in relation to the *inner* self, the true center of experience. The statement was but another expression of Jackson's final idea of subject-consciousness now interpreted as the ultimate frame of reference of all objective states of consciousness. There is embodied in all these statements an undeniable *tendency to conceive man's world and experiences as shaped by man's consciousness;* "objective states quite detached from subject consciousness would be mental states of nobody's having" (6, II, p. 94). In other words, a world existing outside our own consciousness would be nonexistent to us. This idea forms the idealistic element in Jackson's doctrine, not denied but rather completed by his experimental thought. But should the brain, one may ask, not be reckoned among the objective states a person is able to "have"? Should we then allow *one* objective state—namely a division of the highest centers —to be the correlative physical state of subject consciousness "out of which come *all* states of consciousness"? States of consciousness, we are taught, occur *during* activities of the highest parts of the nervous system and not *from* them. Subject consciousness was also defined by Jackson as the "awareness of our existence as persons having the objective states making up for each, the (his) Universe" (6, II, p. 96). Is it conceivable, we may ask, that subject consciousness occurs during activities of just *one* of the parts of his Universe, namely his highest centers?

Jackson would never have accepted any psychical state not paralleled by a corresponding physical one. Forms of thought, he said, even if supernaturally given, must have *some* physical basis (6, II, 111). The opposite would have meant the end of the doctrine of concomitance. He rejected the idea that the centers for consciousness could be sliced away without disturbing the rest of the organism (6, I, p. 159). He also rejected the idea of an "autocratic mind sitting at the top to receive sensations as a sort of raw material, out of which to manufacture ideas, etc., and then to associate these ideas" (6, II, pp. 97–98). The reader is reminded of the Cartesian doctrine of the seat of the soul. But to the evolutionist it was obvious that the highest centers during the activities of which consciousness arises, are only centers evolved out of the lower ones; it is true, it remained an open question how "far down" in the nervous system consciousness extends. Jackson never abandoned the use of the term "organ of mind," though he liked to put it in quotation marks. His statement "for my part I think the whole body is the organ of mind" (6, II, p. 85), reads like a manifesto. No doubt, Jackson was an adherent of the doctrine of the omnipresence of the soul rather than its local residence (11). By using the term "organ of mind," he ascribed to the nervous arrangements their roles as *instruments* rather than simple *concomitants.*

Affection of Consciousness in Insanity

According to the principle of concomitance, the physical series and the psychical series, though occurring in parallel, remain completely isolated from one another. Each event of any of the two series must be defined in terms

of the series to which it belongs. This is the reason why Jackson devoted much effort to exclude psychological qualifications from physical processes, such as movements. Conversely, one should expect the same author to describe psychical processes in their own terms and avoid any physical qualifications. Did Jackson, when turning to the study of insanities, apply his method as soberly and strictly as in his analysis of disordered movements? It is one of the basic tenets of the Jacksonian doctrine that a negative affection of consciousness exists in every case of insanity.

But one gains the impression that Jackson never ceased to be a neurologist, that he never denied his primary vocation and foremost task, namely to study nervous function in its relation to the nervous system. The following quotation is significant:

> "Our concern as medical men is with the body. If there be such a thing as disease of the mind, we can do nothing for it. Negative and positive mental symptoms are for us only signs of what is going on, or of what is going on wrong, in the highest sensori-motor centers" (6, II, p. 85).

That his sphere of experience remained limited to hospitals and did not extend to asylums, may have deprived him of those observations an alienist is able to make daily. But this very limitation enabled him at the same time to see the great harvest the physician can expect from the study of those cases in which there are very slight departures from the patient's normal state—"from slightest temporary confusion of thought to deep coma" (6, II, p. 484). In his significantly modest and humble manner he declared that he should not presume to address alienists and physicians on their special subject, had he not the hope that from a long study of simpler diseases of the nervous system he might contribute something of at least indirect value for the elucidation of the most complex problems they have to deal with (6, I, p. 377). It is indeed to his restricted field of experience with psychoses, in the clinical meaning of the word, that we owe his masterly descriptions of post-epileptic states of mental alienation. Could there be any better proof that insight into natural phenomena, abnormal or not, is to be expected from the *intensity* with which experiences are felt rather than their *extent*, i.e., the number of cases seen? Convulsive disorders served Jackson as true models of transient insanity. Their study protected him at the same time against the danger of severing the scientific ties with his design of the nervous system which remained, I believe, his favorite subject through his entire life. Thus emerged quite naturally his study of post-paroxysmal states, leading him from that of *paralysis* to *aphasia* as the second and epileptic *mania* or transient insanity as to the third stage of investigation. In all of these states he identified the general law of dissolution, namely the reduction from the complex and special toward the simple and general, "loss of control" or overactivity of remaining and unaffected levels of activity.

Thus was saved, he believed, "the harmony of psychology with the anatomy and physiology of the nervous system" (6, II, p. 402). This was written in 1889. But as early as 1873, he committed himself to the following program:

> ". . . in order to make our work at cases of aphasia a *methodical part* of our work at other cases of disease of the brain, we must reduce the symptoms to their lowest terms—to the same terms to which many of the coarser symptoms are reducible, that is to say, to movements (sensori-motor). We must study affections of speech, so far as is practicable, in the same manner as we do cases of chorea, convulsion, and hemiplegia" (6, I, p. 84).

He never ceased to study insanities as diseases of the highest centers or the physical basis of consciousness. The contemporary reader will not understand his conclusion that there is "paralysis" in all cases of insanity corresponding to the universality of the representation of the body by the highest centers, unless he realizes that Jackson did not allow himself to analyze states of consciousness in their own, i.e., psychical terms.

Jackson obviously considered his aim reached by *enumerating* rather than *analyzing* as negative mental states phenomena such as defective perception, declining reasoning power, failure of adaptation to present surroundings and the absence of the "finest" emotions in comparison with illusions, delusions, extravagant conduct and abnormal emotional states which he considered as positive mental states. He was only concerned with the "factors" of insanities (6, II, pp. 411-421). Every case

of insanity was considered by him to be a function of four variables, namely the depth of dissolution of the highest cerebral centers, the persons (life period, intelligence, education, profession) who undergo dissolution, the rate at which dissolution progresses, and the local bodily states and external circumstances.

In this respect it is most significant that Hughlings Jackson's doctrine of nervous function, though ignored by many of his contemporaries, and revitalized by only a few neurologists of the generation which succeeded him, never passed completely out of existence, above all in Great Britain. But his doctrine of consciousness fell into oblivion, until an eminent French psychiatrist, Henri Ey, rediscovered its scope and usefulness for the study of mental disorders. Ey (3) insisted on the anti-classificatory approach of Jackson, his emphasis on dynamics rather than clinical entities and diagnosis. But Ey also stressed the similarity between Jackson's distinction of symptoms resulting from diseases of the central nervous system into *negative* and *positive* ones on one hand, and Bleuler's basic distinction between *primary* and *secondary* ones on the other, the primary symptoms being the immediate result of the morbid process, anatomical or chemical, the secondary ones representing the reaction of the affected individual. Bleuler interpreted the latter as "abnormal effects of the normal processes going on in the primarily affected psyche," citing affectivity as gaining an abnormal dominance over the disturbed intellectual functions in schizophrenics. The neurologist familiar with the doctrine of Jackson has no difficulty in identifying the Bleulerian psycho-dynamics with the Jacksonian neurodynamics or overactivity of the spared parts, the so-called release phenomena. Still more surprising in this respect is Bleuler's interpretation of the secondary symptoms as results of more or less successful adjustments to the primary defect. The term "adjustment" definitely betrays a *teleological* meaning and recalls that isolated fragment of Darwinism in Jackson's doctrine, little understood and hardly mentioned so far, that the secondary symptoms represent the "survival of the fittest" under the new conditions. Thus, the identity of the Jacksonian and Bleulerian views seems almost complete. But it remains purely incidental, since Bleuler never mentioned Jackson; nor did the name appear in his bibliography comprising 850 other references (2). It remains doubtful that Bleuler was familiar with the writings of Hughlings Jackson.

It is not generally known that Bleuler referred to neuro-physiology as the model science. In the final analysis, Jackson's approach towards mental disturbances as manifestations of affection of consciousness was a physiological one. It is to this character that Jackson's approach owes its most general and, as he understood it, most scientific quality. His approach reveals the maximum of benefit one may derive from an investigation of the physical concomitants of psychic phenomena. The road to an interpretation of insanities in neurophysiological terms was open through a daring stratagem implied in Jackson's doctrine—namely the reduction of mental disturbances to those of conduct as a complex of *movements,* the only manifestations of animal life allowed to be represented in the nervous system and its different levels. Thus was saved the regional diagnosis of abnormal mental phenomena. But here were also the limits of Jackson's method. He did not study mental phenomena in their own terms; he merely listed them in a descriptive manner. It was not the doctrine of concomitance which stood in the way of a study of the psychic aspect in its own terms, provided the two "utterly different" terms, i.e. the psychical and the physical, remained separated from one another. That Jackson, who at an early stage of his academic life considered the study of philosophy instead of medicine, should have been unable or unfit to explore the psychic aspects of human life in its own, i.e., psychic terms, is an assumption which can immediately be discarded. I believe rather that the *concept of science* in his time was not broad enough to include individual manifestations of life, psychical or not, within its field; it was still that of a most *general* and anonymous body of human knowledge. But the exploration of psychical phenomena in their original setting necessarily tends toward individualization. Once more, however, we are able to discover in Jackson's writings anticipations of a biographical conception of disease. He defined the positive mental symptoms resulting from dissolution of higher levels

as "samples of a mentation which is only abnormal in contrast with the mentation of the prior self X (or with that of some arbitrary standard of sanity" (6, II, p. 416). In this definition was denounced the relativity of the *statistical* norm-average; in contrast, a strictly *individual* criterion of health and disease was postulated. These conclusions bear a surprising resemblance to those reached by Jackson's great French contemporary, Claude Bernard, and published posthumously (1, 8).

Conclusions

The history of medicine lists no physician daring enough to adopt the *idealistic* thesis that man's brain is but an idea, if not an illusion. Most contemporaries still cling, wittingly or not, to the *materialistic* thesis, according to which mental phenomena, abnormal or not, are the outcome of nervous structures and their activities. The adherence to this thesis stands in strange contrast to the inner world of *beliefs* and their outer manifestations displayed by physicians and scholars who, in matters scientific, would never yield to any metaphysic temptation. Thus emerges the perilous dissociation of the modern scientist having two different thoughts, one for his laboratory and his research, the other for his interhuman relations, his attitude toward life and death, health and disease, his concept of man's place on earth and in the universe. As shown in a previous study (11), self-consciousness is the critical point at which the brain materialisitc thesis collapses. As seen in this study, the doctrine of concomitance breaks down at the same point. *Man simply cannot make his own self perceptible through any material structure whatever. Nor can any material structure serve as an intelligible "concomitant" of his self.* Were we to conceive both psychical and physical states as two states of consciousness or methods of *thought* (12), at least the two things would no longer be "utterly different" or incommensurable. The nature of their interrelation will still remain beyond human intelligence. Whatever the formula adopted, mental phenomena must be expressed and studied in their original terms. We must question the legitimacy of the thesis that science does not begin until the language of life and immediate experience has been translated into that of anonymous symbols, whether these be anatomical, physical, chemical or physiological ones. No such symbol will teach us what a human being experiences in pain. Nor will it ever deny to the patient the certainty of the site of his sensations, regardless of our own objective schemes of localization and projection. Nor will any design of the nervous system teach us the reality and the inner structure of insanity. Here were the self-set limits of Jackson's doctrine of consciousness.

This paper is dedicated to Professor Dr. M. Minkowski, Director of the Institute for Brain Research at the University of Zuerich (Switzerland) in commemoration of his 70th birthday.

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OUTBREAK OF GANG DESTRUCTIVE BEHAVIOR ON A PSYCHIATRIC WARD[1]

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INTRODUCTION

Psychiatric journals seldom report ward life problems handled unsuccessfully, especially instances of the destruction of property and assault upon personnel. It is true, nevertheless, that these "disintegrative" ward events occur often enough to be of serious concern to personnel in staff conferences.

The paucity of reports of disturbed psychiatric wards may result from the paucity of investigation of the mental hospital ward as a system of human action: only a few studies are available in which the ward as a social system is considered. An analysis of those social factors associated with "good" and "poor" social interaction among patients formed the basis of this investigation (1). A study of the social clique membership on a female acute psychiatric ward as a function of a hospital social system was completed recently (3). Stanton and Schwarz discuss, from a clinical viewpoint, the manner in which cleavages between administrative and practicing psychiatrists result from "stereotype" decisions regarding the social life of the patient (5).

The present report, continuing an emphasis similar to those just mentioned, investigates the influence of a severe disruption of the social life on an acute psychiatric ward on both the patients and personnel. The value of a sociological view of the event, and the techniques of analysis the viewpoint affords, are related to the solution of the problem.

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These investigations were carried on at the Boston Psychopathic Hospital under the general direction of Dr. H. C. Solomon, Superintendent of the hospital, and Professor of Psychiatry, Harvard Medical School.

METHODS AND PROCEDURES OF THE INVESTIGATION

Presently a full description of the episode is given; meanwhile, the basic facts are offered as follows: between a Friday afternoon and the following Monday morning, on a 24-patient male acute psychiatric unit, there occurred a series of disturbances on the ward including destruction of hospital property, and in one instance, assault by a patient upon a staff person. On Monday morning at a staff conference a discussion resulted in an invitation to a few members of the research department to investigate the social conditions of the disturbed ward and to provide an analysis, if possible, of factors responsible for the events.

METHODS

The choice of method was determined by the following objectives of the investigation: 1) the location in the ward system structure of the person-to-person associations, and especially to define the "clique" on the ward, with its "leaders," "members," and "sphere of influence;" 2) appraise the effect on the conscious feelings of the patients of the disturbances and outbursts of atypical social behavior; 3) assess the personnel method of analysis of the situation, and the techniques obtaining from this analysis. The three methods adapted to these objectives were: 1) observational sociometry, 2) open-end interviews with patients, and 3) interviews with key personnel and evaluation of the discussion of the events at the Monday staff conference for the assessment of personnel attitudes related to their analysis and treatment of the ward situation.

Observational sociometry, known also as the "clumping technique" (2; 4) consists of periodic, half-hour observations on the ward continuously for an eight-hour period. Observation is made of the contacts among patients. Each patient received two scores: (a) a "proximity" score, or the sum of the times

the patient was seen in the company of another patient or patients, and (b) a "sphere of influence" score, or the sum of patients throughout the eight-hour period which a given patient contacted. Clique "members" were defined as the patients observed together most often; clique "leaders" were defined as patients of widest "sphere of influence" and highest proximity to other patients.

Open-end interviews with the 24 patients on the ward were conducted by a social scientist who asked each patient the following questions:

(1) When did you enter the ward?
  (a) How did you feel about the ward then?
  (b) How do you feel about the ward today?
(2) What caused your change (or lack of change) of attitude?
(3) What do you feel could be done to make the ward a better place for you?

The interviewer urged the patients to answer as fully as possible, and with some patients, "probed" for answers until satisfied he had as full as possible an answer. The interviewing required eight hours.

Interviews with personnel were conducted by a social scientist, who talked informally with staff persons about the disturbances on the ward, and recorded, with the factual information, personnel feelings about those events and suggestions for preventing a recurrence of ward disturbance. On Monday notes were taken by the social scientist of the comments by personnel at the staff conference.

Procedure

A result of the staff conference was an invitation to the investigators to study the ward under discussion. The purpose of this study was to provide sociological analysis of "causes" and "effects" of the disturbances on the ward. One investigator made sociometric observations, and the other investigator interviewed patients and staff persons. A nursing supervisor was trained to observe and to make some observations; so that the ward was observed for the entire eight-hour period of investigation.

The Episode of Ward Disturbance

The period of severe ward disturbance began suddenly Friday with an outburst as a series of atypical social events, including destruction of hospital property and assault upon personnel, and ended as abrupty as it began, Monday noon, when the ward was again "quiet." The disturbance on the ward, personnel said, "was brewing Friday," "came to a head Saturday morning," and persisted Saturday night and Sunday, with events of increasingly severe destructiveness, to Sunday night, and therefrom to subside until Monday morning. Reports did not establish a precise sequence of events, but all informants agreed to the following as a list of consequences of the disturbed behavior on the ward (6):

1. Sinks pulled off the wall in the toilet room.
2. The toilet room flooded on two occasions.
3. The outer hallway flooded.
4. Windows in the toilet room broken.
5. An estimated 40 window panes broken on the ward.
6. Chairs in the sunparlor and on the ward broken and overturned.
7. Magazines and newspapers strewn throughout the ward, the sunporch area and the grounds below the ward.
8. Toilet tissue littered on the toilet area and adjacent hallway.
9. A table broken, a radio put out of operation.
10. Beds of the ward overturned and/or stacked upon each other in corners of sleeping areas.
11. Dishes broken.

Also, a patient assaulted an attendant, and another "psychopathic-paranoid" patient attempted what personnel termed "sham suicide" by exposing himself to gas from an oven, and again, by attempting theft of a lethal medicine ampule.

The disturbance on the ward insinuated itself into the community environs when the shouting of patients calling "Help!" awakened neighbors, who summoned police officers to the hospital area. The police met hospital administrative officers, who related the causes of the "disorderly conduct," and the officers reported this information to the citizens.

Initial attempts to control the patients on the disturbed ward included the following administrative decisions:

1. Order was given to *restrict* the "high" (violent) patients to the ward area, thus limiting their privileges.
2. Order given to *detain* the violent patients from the weekly "movie" entertainment.
3. A patient, whom nurses and attendants reported to the executive officer on duty as the "ringleader," was *secluded*.

The reason given for secluding the "ringleader" was "to protect him from the other patients who were about to gang up on him."

Staff persons' perceptions were not limited to the facts of destruction but included "intuitions" about the rise of tension on the ward and the probable leaders or "gang" associated with the destruction. However, personnel were unable to organize their facts and intuitions to prevent the breakdown of the ward social structure.

Factors Related to the Episode of Destructiveness

Following is a discussion of the discernible factors contributing to the outbreak of aggressive and destructive behavior on the ward. The serial order does no intend either importance or contiguous relation among the factors.

Concentration of Paranoid-Aggressive Patients

At the time of the disturbance, the ward had an unusual complement of aggressive and paranoid patients, diagnosed "psychopathic personalities." Most of these individuals were young. They were admitted to the hospital by referral from the courts, which requested study by psychiatrists of their anti-social behavior, emotional instability and possible paranoid schizophrenic tendencies. These patients continued in the hospital the aggressive behavior which had rendered them misfits in society. They endangered the ward equilibrium because of this aggressive behavior and because, as socially perceptive persons, they organized themselves into a goal-directed clique (sociometrically defined) or "gang" which, when motivated, easily enlisted cooperation from less perceptive and less socially integrated patients. At least, the "power" concentrated in the aggressive "gang" dominated the other patients, who could neither prevent the destruction nor refuse the gang tacit approval of their tyranny.

Clique Resentments of Ward and Hospital Administration

To begin with, the clique members were resentful of the "justice" which put them into a mental hospital, which, for their part, was tantamount to a prison. The insult added to their injury was the feeling that they were discriminated against, as shown by their detainment from social activities permitted to "treatment" patients or "non-court" cases. The court cases, as those patients are called, are considered diagnostic problems and stay in the hospital but a short period, after which they are returned to the courts for disposition. Staff persons were aware of these facts, and were less interested in establishing personal relationships with these patients than with the "sicker" "treatment case" patients. The staff persons' want of relationship with the court case patients is heightened by the fact of resentments against them for taking bed space in a *psychotic* patient hospital, and because the bed space used for court cases is not paid for by the patients or their relatives. The hospital is not reimbursed. Further resentment by personnel may develop because the court case patients are admitted by a judge, whose order takes priority, so far as admission to the hospital, over any and all psychotic persons, no matter how acute or perilous their illness. Thus, an objective of the hospital, as treatment of the sick, is to an extent curtailed by the inflow of patients from the court.

This discrimination is translated into administrative orders which prohibit certain social privileges to court case patients. For example, they do not go on picnics outside the hospital, and often they are detained from movies, and are prevented access to O. T. facilities, the use of recreational facilities and freedom of the grounds. Specifically, the clique group members resented "cold food" and the regulation of their social privileges. Thus, resentments toward patients extended into resentments toward the hospital administration. Then resentment to hospital authority was directed to those beds and desks and sinks which

stood for it, and which symbolically, therefore, were destroyed.

Poor Communication Between Personnel

This was manifested in two ways. First, attendants and some nursing staff members felt that trouble was brewing but failed to alert administration to the problem. Second, personnel were divided in their loyalties to different patients. They disagreed in identifying the main instigators and the factors responsible for the outbreak. Instead they kept their loyalties and identifications largely to themselves and failed to seach common understanding. Notes taken from a staff conference showed clearly the existing antipathies among personnel:

1. "The movies left all the disturbed ones back on the ward. . . . There was too small a coverage with the disturbed patients." (Nursing Supervisor.)
   "The ward was pretty good during the movie." (Psychiatrist.)
2. "They (the destructive patients) didn't ask to go back to the ward." (Male Supervisor.)
   "They did ask to go back to the ward." (Head Nurse.)
3. "Blank (a patient) likes to disconcert the staff." (Head Nurse.)
   "No, he doesn't." (Male Supervisor.)

A few examples of the communication difficulties may be quoted from individual interviews with personnel:

"There was a weekend blowup because the personnel's views are not known. . . . There is a need for more communication from the upper levels to nursing people." (Head Nurse.)

Personnel had conflicting analyses of the causes of the difficulties; for example:

1. "They (the destructive patients) need more help, more individual attention." (Psychiatrist.)
2. "We should send the food up to the ward later so that it does not cool off so soon." (Attendant.)

The Weekend Slump

During the weekend the size of the ward staff is reduced by at least 2 out of 5, giving a lower staff-patient ratio. One O. T. worker carries the load of 4 regular O. T. staff persons. Thus, O. T. and recreational activities are relatively discontinued. Patients are left very much to their own devices. They are not offered interesting or distracting activities. Their resentments and aggressions grow.

The Solution of the Problem

At the height of the disturbance on the ward administrative officers took steps to solve the problem through established psychiatric techniques: the ringleader of the group was secluded and given somatic treatment; some patients were sent to occupational therapy or to physiotherapy; and other patients were taken to the yard, leaving the most disturbed patients on the ward with the diminished ward personnel team to look after them. On Monday morning psychiatric decisions made on Friday (before the outbreak) were carried out; one of the most disturbed patients was transferred to another hospital; another patient began treatment; and another was transferred to a different ward in the hospital. In addition to these administrative decisions, emergency steps were taken to separate the active members of the "gang" by prescription for one patient to have physiotherapy (where he could take out his aggression on a punching bag), and for another to begin his somatic treatment.

Discussion

Outbreaks of violence in psychiatric wards are very familiar. Usually they involve one individual who acts out psychotic content in some aggressive manner. These are often catatonic, paranoid or turmoil schizophrenics. Their outbreaks, often unpredictable, can be very disturbing to the whole social system but do not generally involve a gang action. Gang action among disorganized schizophrenics is relatively rare; but gang action among better organized paranoid schizophrenics and psychopaths occurs not uncommonly. Sometimes manic patients are able to bring other ward citizens into aggressive destructive group activity (7).

Clique formations are not rare in psychotic wards. Kegeles has shown in repeated sociometric studies that cliqlues are always to be found (3). Well-preserved psychopaths living among psychotic patients may dominate the group (3).

Our study points up the stress which arises when mental hospital personnel have underlying resentment against any group of cases—in this instance psychopathic individuals hospitalized on wards meant for psychotic patients. Personnel do not regard them as true "treatment" cases. They do not form positive identi-

fications. Administration resents the loss of bed space and the Department of Mental Health gets no financial return for their hospitalization.

Stanton and Swartz have adequately described the disturbances which patients manifest in triangular situations, that is, where personnel are at odds as to their identifications, loyalties and ideas of manageremnt. This was very much the case in the present situation (5).

One problem arises when an attendant attempts to indicate to the physician his feeling that the ward is in a potentially explosive state. The physician is slow to take the attendant seriously, first, because attendants are often overly anxious in their relations with patients, and second, because the attendant's anxiety often contributes to the outbreak. The physician is in the position of wishing to allay the attendant's anxieties, without closing his eyes to serious realities which the attendant may be the first to recognize.

Attention has been called to the weekend "slump" as one of the major defects in hospital treatment. It is uneconomical and perhaps at times even dangerous to patients' lives and welfare. The weekend slump in a mental hospital is greatly aggravated by the fact that many of the "non-court" patients go on visits, leaving behind patients who may become resentful, disturbed or depressed. The whole treatment pattern is crudely interrupted by absence of key therapeutic personnel and by a complete break in wholesome social distractions.

As to the handling of the disturbance, it is clear that personnel resorted to the time-honored method of dealing with gangs, namely, separating the members involved. A variety of means were used—seclusions, distracting by O. T. therapy, intensive individual therapy and transfer or discharge. These methods are apparently adequate, but unfortunately were applied after the clique had run its anti-social course. It is to be hoped that such outbreaks might be avoided by preventive measures without damage to the ward society. This might be accomplished by increasing personnel's awareness of existing cliques and of their goals, by better communication, and by reducing weekend breaks in social-therapeutic activities. Perhaps most important of all would be a better understanding at the policy level with respect to the management of so-called court-cases in a mental hospital primarily devoted to intensive treatment of psychotic maladjustments. In large mental hospitals where the "court case" problem occurs only infrequently, there remains the problem of gang aggressive behavior due largely to "neglect" of patients whose energies need to be diverted to constructive types of occupational activities.

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THE THALMO-CORTICAL CIRCULATION OF NEURAL IMPULSE

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Twenty years ago, George G. Campion and Sir Grafton Elliot Smith (2) published, under the title *The Neutral Basis of Thought,* a volume which attracted too little scientific attention.

In this volume, Dr. Campion stated it seemed apparent to him that "a thalamo-cortical circulation of neural impulse will in the future come to be found as fundamental for the neurology of what we colloquially call 'thought' as the conception of the circulation of the blood is for modern physiology."

The hypothesis of thalamo-cortical circulation was suggested to Campion by his long consideration of the process of thinking coupled with his reflections on the clinical studies of Henry Head, particularly those studies of veterans of World War I who suffered thalamic injuries.

Aside from the hypothesis of Campion and Smith, there have been suggestions of thalamo-cortical circuits based essentially on neuro-anatomical evidence. I shall not attempt to review these, but shall pass on to the fact that psychological consideration of the response of schizophrenic patients to prefrontal lobotomy led some of us independently to postulate an excessive and morbid circulation of neural impulses between cortex and diencephalon as the neurophysiological basis of schizophrenia. In May, 1953, in a joint presentation (9) with Dr. James Q. Holsopple and Dr. Maurice Lorr. I stated that as one result of the VA Lobotomy Research Project:

> "The hypothesis is presented that the splitting of the schizophrenic process is the result of a conflict unresolvable to the patient, reflected on the psychological side by anxious preoccupation and on the neurological side by an unresolving morbid resonance or eddy of neural activity between cortex and diencephalon, which jams the higher circuits and leaves the control of behavior to lower centers capable only of steretyped, inflexible and defensive adjustments. Pre-frontal lobotomy is presumed to benefit the schizophrenic patient by destroying circuits involved in the maintenance of this morbid eddy or resonance and permitting him more effectively to integrate and use what he has left."

We were led to this hypothesis by the effectiveness of prefrontal lobotomy in reducing anxiety, in reducing active conflict and in diminishing psychotic symptomatology which we had come to regard as a direct outcome of intolerable conflict.

The thalamus is older in its evolution than the cortex. It is a relay station for sensory impulses which require discriminatory perception. Such impulses are routed from the thalamus to appropriate cortical centers where they are organized. The thalamus appears to have a particular role in affective experience, and the hypothalamus, from which the thalamus evolved, is concerned with the automatic discharges accompanying strong emotion. The cortex with its projection system appears as an organ contributing the higher levels of perceptual discrimination. One of the functions of these discriminations is the avoidance of danger perceived by the telereceptors.

In contrast to such messages from the distance-receptors, pain carries a message of immediate harm. Pain is a signal of danger which does not require the fine discrimination of the cortex for its recognition. Pain is not represented at the cortical level in the manner that the special senses are, but, with its affective and emotional character, apparently operates directly at the thalamic level.

There is, of course, no conflict between the concept that thalamo-cortical circulation of neural impulse is essential to thinking, and a concept that an excessive and morbid amplification and fixity of such a circulation is the neurophysiological concomitant of schizophrenic conflict and preoccupation. Indeed, these concepts are complementary. Furthermore, since speculation by different people in different periods on the basis of very different clinical observations relating to different problems produced hypotheses with such an interesting degree of similarity, it may be profitable to consider how far these hypotheses may account for other phenomena resulting from organic brain damage.

If we conceive of the thinking process as involving a thalamo-cortical circulation of neural impulses, then we might logically expect that such a circulation would be particularly characteristic of and essential to deliberative and reflective thinking. It would logically follow that the individual who has sustained extensive though non-specific damage, either to cortical areas or to the white matter connecting diencephalon to cortex, should be more severely handicapped in his capacity for the reflective thought than in the quality of his immediate thinking. And this, indeed, appears to be the essence of the picture of cerebral damage, particularly when it is sustained in infancy before the patterns of brain activity are established, as in the children with infantile cerebral palsy. The capacity for reflective thinking appears to be grossly reduced in these children even when the intelligence is relatively spared. There is a grossly diminished degree of continuity of thinking and the capacity for sustained attention is very seriously impaired. The attention of the child momentarily jumps to any new stimulus and a short attention span and distractability are highly characteristic (16, 4). The capacity for a self-regulated stream of mental activity is reduced and the child is more than usually stimulus-dependent. His characteristic distractability even interferes with his capacity to recognize wholes if the constituent parts of those wholes show any distracting detail (10).

There is, furthermore, a stabilizing and inhibiting effect exercised by reflection which might be expected to reduce the extremes of fluctuation of behavior, and to result in a smoother, more consistent performance. This is, of course, diminished in the cerebral palsies. In these we see impulsiveness, excitability and over-reactivity to stimuli.

When the brain damage is chiefly frontal, certain effects may be particularly conspicuous, perhaps because the picture is not obscured by deficits in any particular sensory or motor projection systems. The reduced capacity for a continuity of thought in the individual suffering frontal lobe damage might well be expected to result in the kind of phenomena described by Lidz (11) as a limitation of the associational range; by Halstead (7) as a diminished capacity for abstraction; and by Goldstein (6) as an impairment of the abstract attitude.

Goldstein states, "Tasks that demand reflection for execution will suffer more than those that can be executed unthinkingly (6, page 88), This limitation would also explain the tendency, which has been described by Freeman, of the lobotomized patient quickly to "run down" when asked to discuss himself.

The capacity of the human subject to preserve active and on-going mental activity in the absence of new stimulus from the outside world would seem to require the postulation of a circular or reciprocal activity within the central nervous system, an activity capable of sustaining itself even in the absence of new sensory stimuli. The capacity of the human for motivation toward a persistent goal, and for a spontaniety seemingly not dependent upon the stimulus of the immediate situation, argue strongly in the same direction—in that these clearly imply a capacity for on-going self-sustaining activity not completely disrupted by new stimuli or by intervening activities.

It would seem that the breakdown we know as schizophrenia occurs when this self-sustaining neurophysiological activity becomes fixed to the extent of a loss in the capacity to respond appropriately and adaptively to new stimuli. Psychologically speaking, this breakdown seems to occur when the individual lacks the psychological resources and resilience to work out either a synthesis or a compromise solution between intense conflicting tendencies or effectively to suppress either. Not infrequently, it is precipitated by the incapacity of the adolescent or young adult, trained in our culture, to achieve any resolution or compromise between the conflicting forces of his self-concept and his sexual drive.

It is postulated that there is an optimum level of thalamo-cortical circulation for effective mental activity, although presumably that level may vary between tasks requiring reflective thought and those requiring immediate action. An overload on the thalamo-cortical system, such as might be an expression of urgent, insoluble mental conflict, might well result in oscillation and threatened runaway in the system itself. Should the failure of satisfactory resolution of "information" so heighten

the activity as to result in the establishment of a predominantly positive feed-back, we should expect a runaway activity between diencephalon and cortex. This might be experienced as an uncontrollable runaway anxiety such as we often see at the beginning of an acute psychotic break.

Complex mechanisms often involve self-locking systems (1), and complex mechanisms in overactivity might reduce that overactivity by the evolution of such systems. It would seem that this may be the basis underlying the evolution of a paranoid psychosis in which the false resolution of paranoid projection would appear to be at least in some cases a self-locking system which reduces the overactivity of the thalamo-cortical circuit and thereby reduces its expression in inner conflict and anxiety. This may render the patient better able to function in most areas of his daily life than he was before he achieved this false resolution.

On the other hand, in the cases of schizophrenia which are insidious in onset, there is little reason to postulate overactivity of the thalamo-cortical circuits. Even though some schizophrenic preoccupation is obvious, there is typically no anxiety or other evidence of heightened activity. In such cases the self-locking system of delusion formation does *not* bring activity and anxiety to a more functional level: rather, it removes them further from a functional level and we see the picture of progressive hebephrenic dilapidation.

If we consider somewhat further the relation between mental conflict and neurophysiology, it would seem that *conflict may be regarded as activation of two (or more) neural patterns tending toward discharges which are mutually incompatible.* Neural patterns are used here in the sense of Head and Holmes' "neural schemata," and Semon's "engrams."

When two engrams tending toward incompatible discharges are activated simultaneously, one may become dominant and may thereby determine the action pattern. On the other hand, each may block the discharge of the other. If the tension in one or both systems is thereby increased, the neural impulses so blocked may be expected to show a tendency to spread into other channels. Such a tendency is clearly demonstrated in one of the classical experiments in physiology A. J. Carlson required of his more advanced students. If under anesthesia the spinal cord of a dog is hemisected above the segments innervating the phrenic nerve, the diaphragm on the ipsilateral side is immediately paralyzed. If now the contralateral phrenic nerve is transected, thereby checking all nerve impulses to the contralateral portion of the diaphragm, diaphragmatic breathing ceases, and asphyxia sets in. Carbon dioxide rapidly accumulates in the blood stream and increases the stimulation of the respiratory center in the medulla. Under this added stimulation of increased $C0_2$, the ipsilateral diaphragm begins to move again in breathing. This leads to the conclusion that, with this increased tension of CO_2 in the system, the nerve impulses flowing down the intact side of the spinal cord now cross the midline and activate the intact phrenic nerve.

It may well be that the wakefulness which so commonly attends a persisting mental conflict is to be explained in this fashion. The incapacity to find a satisfactory resolution for conflicting tendencies certainly results in tension if these conflicting tendencies are strong. If there were spread of excitation so heightened into the activating system described by Magoun (12), the reticular substance constituting what Penfield (15) calls the "centrencephalic system," a preoccupied sleeplessness might be expected, and, of course, that is what we see in acute schizophrenic conflict states.

It may be worthwhile to review certain broad considerations which relate to these matters. Physiological tensions within animals activate behavior. Behavior serves, with varying degrees of effectiveness, to relieve such tensions. In educable animals, that behavior which is most effective in relieving tensions tends to be repeated. Effective behavior tends generally to be patterned behavior, for unpatterned behavior is not often effectual. A significant part of human growth is the achievement of more numerous and more highly developed patterns of behavior and of thinking.

We know that patterned behavior is related to patterned neural activity, and it seems reasonable to presume that orderly thinking is also related to definite patterning of neural activity.

A state of acute conflict in which two active

engrams with mutually incompatible pathways of discharge block each other may be associated with an accumulation of tension. If there is a failure to resolve the conflict and discharge the tension, a diffusion of neural excitement might be expected. A state of acute perplexity and puzzlement, whether in a normal person or in a schizophrenic, seems probably related to a more diffuse and unorganized cerebral activity than that accompanying organized thought. The common electroencephalographic findings showing a disappearance of regular alpha activity and often its replacement by low voltage fast activity suggest this, as does the general subjective state. Thinking no longer proceeds in an orderly fashion along clearly defined pathways, but becomes more erratic and even somewhat disorganized, with a subjective mental state of tension and some anxiety.

This anxiety may be interpreted as another phenomenon of spreading neural excitation. Overflow of neural excitation results in activation of hypothalamic structures and through them of the autonomic nervous system. It is of interest that at least in chronic anxiety the discharge need not be the preponderantly sympathetic discharge of a fear or alarm response, but may equally well be parasympathetic, as in the gastric oversecretion which may occur and result in psychosomatic disorders (13). Similarly, overflow into the motor system commonly results in muscular tension and restlessness in anxiety.

The signs and symptoms of a state of acute conflict and anxiety seem to demand for their neurophysiological explanation some consideration of reverberating circuits. The prolonged intellectual preoccupation in acute conflict with the problem certainly involves continuing activity of the cortex. The emotional and autonomic manifestations of acute conflict certainly involve continuing activity of the diencephalon. The extent to which the emotional involvement may rather clearly be determined by the incapacity to find a solution, and the extent to which the highly aroused emotional state may give rise to a misinterpretation of the environment argue for the dynamic interrelation of cortex and diencephalon—an interrelation which must exist in terms of circuits of circular or reciprocal innervation. Such circuits or eddies of neural activity, as they might build up, would affect an increasing fraction of the pathways of the higher brain, rendering them unavailable for other use. And certainly there is good reason to believe that an acute conflict results in some diffusion of neural excitation. Such diffusion might result in new pathways of discharge, which might effectively relieve the tension in both active neural patterns. Such a discharge of tension from two active engrammic systems would represent a synthesis and may be assumed to be one of the physiological events which accompanies the moment of insight or of creativity.

One of the paradoxical results of prefrontal lobotomy is that it seems commonly to reduce the suffering in cases of intractable pain, yet it does not seem to elevate the threshold of pain perception. When asked about the pain, the patient will usually say he still has it but that it no longer bothers him as it did, and clearly he is no longer suffering as he was.

It is well known that the amount of suffering caused by a noxious stimulus of a given intensity is a function of the general state of the individual, including his state of mind. A man occupied with intense effort toward some immediate goal may experience injury with little or no suffering. The same man, when worn down by fatigue, may find a continued noxious stimulus of far less intensity becomes unbearable. This fact has been utilized for example by officials of totalitarian governments seeking to extract information or force cooperation without leaving the obvious physical evidence of less patient methods of torture. A man's sufferings is multiplied whenever a preoccupation with his suffering takes possession of him. The most reasonable explanation of the relief of intractable pain afforded by lobotomy is that it relieves such a preoccupation.

Such a hypothesis, furthermore, could explain the paradoxes discussed by Fulton (5) as resulting from frontal lobe lesions, cutaneous hyperactivity to noxious stimuli coupled with the relief of suffering from intractable pain. If the relief of suffering may be understood as a result of interference with a resonating thalamo-cortical circuit of preoccupation with pain, the hyper-reactivity may, without paradox, be viewed as a release from cortical inhibition.

If we turn from our consideration of the arguments in favor of a thalamo-cortical circulation of neural impulse, which may be advanced on a psychological basis, to a consideration of neuro-physiological studies relating themselves to such a hypothesis, we find another source of support, Dempsey and Morrison reported in 1942 (3) that rhythmic stimulation to the thalamic region of the cat at a rate of about 10 per second produces an increasing, rhythmic alpha-like electrical pulsation detectable over essentially all of the homolateral cortex. I should like to point out how far this has the appearance of activating a resonating system of reciprocal thalamic-cortical circuits with a natural cycle of about 10 per second. If one pushes a child in a swing at about the natural rhythm of that swing as a pendulum, one will see the kind of increasing amplitude of response to successive pushes which these investigators call the recruitment response. Niemer and Jimenez-Castellanos, in 1950, reported (14) neurophysical evidence that in the cat each cortical area has a principal projection to that thalamic nucleus or nuclear group which is known to project to it, and evidence is thus provided of the general existence of loop circuits between related parts of cortex and thalamus. In addition, each cortical area has diffuse projections of varying magnitude to nuclei other than those forming loop circuits, thus providing for the interrelation of functionally different parts of cortex and thalamus. In 1952, Jasper and co-workers reported (8) evidence that cortical projection areas are very extensive in the macaque through the region of the brain stem in the reticular formation and tegmentum of the midbrain, and in the following thalamic regions: the intralaminar nuclei of the thalamus, with adjacent portions of the nucleus ventralis anterior and nucleus medialis dorsalis, rostrally, and adjacent portions of the pulvinar and nucleus supragenículatus, caudally, and the subthalamic region, including the subthalamic nucleus and substantia nigra.

Jasper found that the cortex of the macaque could be driven to an alpha-like response by stimulation of the thalamic region at a rhythm of about 10 per second, thus confirming for this primate the finding of Dempsey and Morrison for the cat. Caudally to the thalamic area, they obtained no such response. Indeed the reticular substance of the lower brain stem is capable of suppressing such responses, for stimulating it directly produces a state of alertness with desynchronization and disappearance of the recruitment response even to stimulation in the thalamic region.

Jasper further reported finding no evidence of direct neural transmission between the striatal area of the visual cortex and the visual association area. Since, however, one of these areas certainly transmits to the other, and they both project stimulations to the thalamic region, this finding might be interpreted to mean that these intercortical connections follow a cortical-thalamo-cortical pathway.

Jonathan Williams (17), on the basis of the effect of amygdalectomy on auditory hallucinations in certain cases, has suggested a pathway of reflection from the cortex, passing through the uncinate fasiculus to the basolateral nucleus of the amygdala, and thence to thalamus and hypothalamus.

Summary

The thalamo-cortical circulation of neural impulse postulated by Campion twenty years ago seems strongly supported today by neurophysiological evidence. This hypothesis can serve to account not only for many of the phenomena of normal thought, but also for many of the phenomena of brain injury, of schizophrenia, and of the therapeutic effect of the brain injury of prefrontal lobotomy in properly selected severe schizophrenics.

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SUICIDE BY PSYCHOTICS

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Introduction

There have been almost no studies made of successful suicides among patients within a psychiatric hospital. Two reasons suggest themselves as possible explanations. One is the disinclination to discuss what might be looked upon, by the uninformed and those lacking understanding, as a blemish on the record of the hospital concerned. The other is the scarcity of material available to any one investigator. As an illustration of this latter point, there have been but 23 cases at this hospital in the 25 years between 1928, when it was opened, and 1953.

This study concerns itself with a detailed analysis of the records of these 23 patients; an evaluation of the data uncovered, some observations on suicide in general, and on suicides among psychotics in particular.

The Problem of Intent

It is generally taken for granted that he who terminates his life, by a deliberate act, intended to do so. This need not be so at all. For instance, there is the case (not in this series) of a young man who amputated his penis because he professed to consider himself a female. He revealed, before he died of hemorrhage, that it had not occurred to him that he might die as a consequence of his act nor did he want to. Nonetheless, he was officially labeled a suicide. Or the man (also not of this series) who stepped out of a third floor window in response to a voice which urged, "Come to me, my son." Before he died of his injuries, he revealed that he fully expected to be borne up to heaven when he stepped out. He had not even thought of any other possibility and certainly was not thinking of effecting his destruction. He was also officially labeled a suicide. On the other hand, the chronic alcoholic, who dies of pneumonia brought on by his indiscretions, the diabetic who dies as a consequence of knowingly and wilfully transgressing his dietary proscriptions, or the obese hypertensive, who violates his dietary restrictions—to name but a few—are officially labeled as deaths from disease, whereas they fulfill the criteria for suicide more than did the two cases cited above. Menninger (12) has labeled these the chronic suicides.

These are a few examples of the difficulty of determining intent to commit suicide within the general population. The factor of intent in a hospitalized patient is even more difficult to evaluate.

Of the 23 patients in this study, 12 were out of the hospital at the time of their act (but still carried on the hospital rolls). Of the 11 who succeeded in destroying themselves while in the hospital, only one was felt to be actively intent upon his self-destruction at the time of his act. All that we have to go by in the evaluation of each patient's suicidal drive prior to his act are the doctors' and nurses' objective notations in the record. It would seem that these would constitute a fairly reliable index of the patient's state of mind and of his predisposition to suicide, but such is often not the case.

In fact, one of the most difficult questions for the psychiatrist to answer and one fraught with much emotional impact upon him because of the possible consequence of his decision is, "Is this patient suicidally minded?" Unfortunately, there is no scale to weigh, no rule to measure and no laboratory test to answer this question. While it is true that psychometric tests may suggest a marked suicidal ideation or even preoccupation, these tests cannot indicate the patient's capacity to act out. In the final analysis, all we have to go by is an evaluation of the patient's mood, his expressed thought content and his manifest behavior; and even these are very much relative because the mood may be masked, thought content may be consciously or unconsciously distorted by the patient or not revealed at all, and behavior may be misleading.

For example, a very obviously and deeply depressed patient who admits he would prefer to be dead may actually do nothing to achieve

that goal, while a patient with little or no apparent depression may proceed to do so. The following incident, quoted from one of the hospital records, will serve to illustrate the difficulty in evaluating behavior. "Today a patient was found in his room sitting on the floor, facing the wall, sobbing violently, his head covered with his bathrobe, the edge of which was stuffed into his mouth." This patient was deemed to be actively suicidal, immediately placed on special suicidal precautions and kept so for a matter of months, despite the fact that the patient explained his crying on the grounds that he was unhappy over the chronicity of his illness, covering his head because he was ashamed to be seen crying, and stuffing his mouth so that his cries would not be heard. This was in 1947. His record fails to reveal any evidence of suicidal intent or action in the three years prior to that incident or in the six years since.

That the interpretation of what constitutes suicidal intent or potential is often a result of the subjective feelings of the interpreter may be, I believe, rightly inferred from the following observations. When the writer first joined the staff of this hospital in 1947, there were two entire wards (with a bed capacity of about two hundred) assigned to patients who were considered to be suicidally inclined. Every patient who looked dejected, unaccountably cried, put his fist through a pane of glass, or verbalized that he didn't care whether he lived or died was transferred to one of these two wards. With the acquisition of a new Clinical Director who encouraged the idea, and the addition of new members to the Psychiatric Staff who were not so dedicated to the old ideas as to be unable to carry it out, it was possible to confine the number of patients placed on suicidal precautions to, at first, a thirty-bed dormitory and later to a twelve-bed one. For the last year we have been able to reduce it even further. In 1952 we placed only three patients on special suicidal precautions, none of them for more than four weeks.

It goes without saying, however, that because the frequent placing of patients on formalized suicidal precautions was abolished, there was no lessening of the precautions themselves. We have emphasized instead the universality of the suicidal pontential in any patient and made all supervising personnel alert to that possibility in all patients and at all times. This more realistic attitude did not lead to an increase in the suicidal incidence; there were four successful suicides in the 5 year period between 1948 and 1952. It is becoming evident, then, that there is little correlation between possibility and actuality. The important factor would seem to be not the identification of predisposition to suicide in *this* patient, or the lack of it in *that* one, but the recognition that such prediction is unreliable. A closer look at previous studies and at our own data will serve to clarify this point further.

Previous Studies

General Population: General Statistics. Although there has been a dearth of material on psychotic suicides, many studies have been made on suicidal attempts among the general population with—by now—fairly well-established data as to age incidence, sex incidence, methods used, motives given, and other similar types of information. Among these studies have been Moore's (13) in 1937, covering 1147 suicidal attempts admitted to Boston City Hospital between 1915 and 1935; Piker's (15) in 1938, covering 1817 attempts admitted to Cincinnati General Hospital over a ten-year period; Siewer's and Davidoff's (17) in 1942, covering 150 attempts admitted over a six-year period to Syracuse General Hospital; Hendin's (6), covering the first 500 attempts admitted to Bellevue in 1948 and Simon's (18) in 1950, covering 50 attempts (exclusively among veterans) admitted to the Veterans Administration Hospital in St. Cloud, Minnesota. Some of the data gleaned from these is that:

1. Only 5 to 15% of the nonhospitalized general population who attempt suicide are obviously psychotic.
2. More women than men attempt suicide.
3. More men than women succeed in suicide.
4. There are more attempts (especially among women) in the under-forty age group but more successes in the over-forty age level.
5. The most frequently used methods are gas, strangulation, and firearms (almost exclusively among men).
6. Motives given for the act are numer-

ous and varied and range from the very unrealistic ("I had tasted all life had to offer, and I thought I'd see what death was like"—this from a 21-year-old) to what many would accept as justifiably quite realistic ("I know I have an incurable illness; I am constantly in severe pain; and I am pointlessly draining our life's savings set aside against the eventuality of my death"—this from a 67-year-old college professor with inoperable cancer).

Some General Findings on Psychotic Suicides

1. Method used. Psychotics, by and large, utilize the same measures of effecting suicide as does the general population, except that a disproportionate number of hospitalized ones utilize some form of strangulation: This is obviously due to the fact that other means (firearms, poisons, bodies of water, etc.) are not available to them, whereas almost any item of clothing or bedding lends itself to that utilization.

2. Time of occurrence. An observation noted by many is the fact that one of the most vulnerable periods in some depressed persons is not when the depression is deepest, but rather immediately after the depression lifts, especially if that lifting is rather sudden. The following explanation for this observation has been offered. The depression is caused by a conflict within the person which he has been unable to resolve. As long as it remains unresolved, the depression persists and may become deeper with the continuing failure of the conflict to be resolved. Then the person "decides" that his death will resolve the conflict; and now that it has been resolved, there is no longer any need for the depression, since the cause has been eliminated. Now that person may be serene, cheerful and even gay, and now also he may proceed to carry out, logically and methodically, the recently decided upon solution of his conflict.

Analysis of Present Series of Suicides

General Statistics

The bulk of our 23 suicides—roughly 80%—occurred among people under 40 years of age. More specifically, nine occurred during the third decade of life, ten in the fourth, three in the fifth, and one in the sixth. This is in sharp contrast to the age incidence of successful suicides among the general population where the national statistics show a persistant ratio of only three out of every ten occurring under the age of forty. Lipshutz (9) in his study remarks that "the patient who has made a good hospital adjustment over a period of years is an unlikely prospect for suicide." This would appear to be borne out by our study, for only 2 of these 23 had been currently hospitalized in excess of three years. This factor is not to be confused with that of prolonged illness, of which our series shows six patients who had been known mentally ill in excess of ten years.

Among our successful suicides there were no Negroes and one female. However, no particular significance can be attached to this because our Negro population is but 2% of the total and while our female population is about 5%, we have had such patients only for the last seven years of the 25 covered in this study.

Previous Attempts

In our series 6 out of 23 patients had made a known previous authentic attempt at suicide. Cases 1, 6, 10, 13, 18 and 19, respectively, attempted suicide ½, 1½, 1½, 2½, 1½, and 16 years prior to their successful attempts. Although there are no satisfactory figures to prove this, the indications are that the incidence of previous suicidal attempts is significantly higher among eventually successful suicides in psychotics than it is in nonpsychotics.

Patients Who Committed Suicide Outside the Hospital

We will now analyze the significant data on the 12 patients who committed suicide while out of the hospital (table 1). None of these, obviously, was considered to be actively suicidally inclined, for all of them were granted these home visits on the basis of three or more doctors' opinions. Parenthetically, it may be added that the psychiatric staff up to 1948 was quite conservative in evaluating suicidal potential and in granting permission for home visits in general. While 6 of these patients are listed as having committed suicide while out

TABLE 1

SUICIDES OUTSIDE HOSPITAL

No. & Name	*Age*	*Date of Suicide*	*Length Out of Hospital*	*Manner of Suicide*	*Duration of Illness*	*Length of Curr. Hospital*	*Diagnosis*	*Previous Suicidal Attempts*
1 J. N.	32	7/12/31	3 wks.	Drowning	3 yrs.	5 mos.	S.R.	Feb. 1931*
2 F. S.	38	8/10/31	2 days	Gunshot	2 yrs.	5 mos.	M.D.D.	None
3 F. P.	38	2/12/32	17 mos.	Hanging	13 yrs.	2 yrs.	S.R.	None
4 F. M.	37	3/ 3/34	3 mos.	Hanging	18 yrs.	1 yr.	M.D.M.	None
5 R. B.	41	11/26/36	2 days	Drowning	17 yrs.	8 mos.	S.R.C.	None
6 P. P.	25	6/ 2/44	1 day	Cut throat	1½ yrs.	14 mos.	S.R.C.	Dec. 1942†
7 S. O.	24	1/ 9/45	6 days	Gunshot	1 yr.	1½ mos.	S.R.P.	None
8 J. M.	24	10/11/45	1 day.	Hanging	5 yrs.	3 yrs.	S.R.	None
9 S. G.	29	1/17/46	9 mos.	Poison (barb.)	8 yrs.	1½ yrs.	S.R.	None
10 V. H.	26	2/ 9/51	3 wks.	Poison (barb.)	7 yrs.	3½ yrs.	S.R.P.T.	Five‡
11 H. K.	38	2/ 9/52	1 day	Hanging	6 mos.	1 mo.	S.R.P.T.	None
12 S. A. B.	22	7/29/52	2 wks.	Hanging	1 yr.	6 mos.	S.R.P.	None

* At another hospital by strangulation.

† At home by gas.

‡ 1st attempt while in service (cut wrists) 1945. 2nd and 3rd attempts while at home prior to admission here (sleeping pills and Paris green) 1946. 4th attempt not likely to succeed (swallowed bottle of insulin) 1948. 5th attempt overdose of barbituate while out on pass, January 1949.

of the hospital less than a week, all of them had been out on many other visits of varying length previously.

There are basically only two courses that a hospital staff may follow in granting permission to leave a hospital. One is to state arbitrarily that any psychotic patient who is admitted to the hospital is potentially suicidal and, therefore, "once admitted, forever hospitalized." To follow this line the hospital ceases to be a hospital in the finest sense of the word, and the doctors no longer need possess any clinical judgment. The other course is to evaluate each patient as the circumstances arise, consider the relative potential for self-destruction and, after weighing all the factors (presence or absence of depression, guilt feelings, ideas of unworthiness, etc., as well as a consideration of present ideation and previous suicidal attempt) arrive at a deliberate judgment.

This was done in the above 12 cases and all were granted leave. On this basis there would seem to be no reason to find fault with that judgment in nine of the above 12 cases since they were judged objectively not to be suicidally minded, their expressed thought content did not indicate that they were, and they had not made a previous attempt. Case 6 had made an authentic attempt at suicide about 1½ years previously, and Case 1 about 6 months previously. Despite this, the other factors—absence of apparent depression, expressed thought content, and general behavior, were strong enough to outweigh the known previous attempt at self-destruction.

Case 10 had made five previous attempts, the first of these in 1945 and the last in January 1949. In between periods of acute psychotic behavior there were periods of considerable remission during which the patient was able to adjust on the outside for months at a time. She left the hospital on such a visit on January 17, 1951 and committeed suicide on about February 9, 1951. This was obviously a planned affair for it later became known that she had set her financial affairs in order and had mailed a letter to the hospital informing us where to look for her body.

Case 11 technically does not belong in this series because he had been discharged outright from our rolls the day previous to his suicide. There never had been any reason to suspect suicidal concern. On the evening of his discharge he had prepared the evening meal for

TABLE 2

SUICIDES WITHIN HOSPITAL

No. & Name	*Age*	*Date of Suicide*	*Status*	*Manner of Suicide*	*Duration of Illness*	*Length of Curr. Hospital*	*Diagnosis*	*Previous Suicidal Attempts*
13 R. F.	34	10/ 9/31	Closed wd.	Leap	2 yrs.	2 mos.	S.R.P.	Two*
14 T. H.	35	4/30/32	Open wd.	Hanging	2 yrs.	1 yr.	S.R.C.	None
15 F. D.	48	5/26/35	Closed wd.	Hanging	15 yrs.	1 yr.	P w/OBD	None
16 B. H.	50	4/25/42	Closed wd.	Hanging	18 yrs.	2 mos.	S.R.P.	Two†
17 G. S.	40	10/29/44	Closed wd.	Asphyxia	2 yrs.	2 mos.	M.D.D.	None
18 S. S.	20	10/ 4/45	Open wd.	Hanging	1½ yrs.	2 mos.	S.R.	Two‡
19 P. L.	54	9/29/46	Eloped fr. closed wd.	Hanging	16 yrs.	8 yrs.	M.D.D.	Three§
20 A. F.	25	10/ 9/46	Eloped fr. escort	Leap	1 yr.	1 mo.	S.R.C.	None
21 H. C.	32	3/30/47	Closed wd.	Hanging	2 yrs.	1½ mos.	S.R.P.	None
22 S. W.	27	4/ 6/47	Closed wd.	Force Broken neck	3 yrs.	1 yr.	S.R.P.	None
23. R. B.	31	10/25/51	Closed wd.	Hanging	8 yrs.	4 mos.	S.R.P.	None

* Attempts 2½ years earlier.
† Attempt exactly 1 year earlier. Drank furniture polish.
‡ Prior to coming to this hospital, 1½ years earlier.
§ Attempts 16 years earlier at onset of illness.

his family, watched television and was in "good spirits" planning to take the family for an outing the next day. The next morning, he had breakfast and then went to the cellar to unpack his bags and hung himself.

Patients Who Committed Suicide Within Hospital

Now we will analyze the 11 patients who succeeded in committing suicide while still within the confines of the hospital (table 2).

Case 13. White male, age 34, known mentally ill two years; hospitalized here two months; diagnosis, schizophrenic reaction, paranoid. Two years earlier he had cut his throat and wrist and was admitted to another hospital. Shortly afterward he had made another attempt, but no details of this are now available. While out with a group of other patients on the hospital grounds, he suddenly climbed (human fly-like) to the roof of the building and jumped. Although his fall was broken by the valiant effort of a psychiatric aide, he died as a consequence of his injuries.

Case 14. White male, age 35, known mentally ill for two years; hospitalized here one year; diagnosis, schizophrenic reaction. Although frequently seen in catatonic stupor, he never had made a previous suicidal attempt nor had he ever given expression to suicidal ideation. He hung himself in the bathroom.

Case 15: White male, age 48, known mentally ill fifteen years; hospitalized here one year; diagnosis, psychosis with organic brain disease (Huntington's chorea). At no time was he considered suicidally inclined. He hung himself with another patient's belt which he had secreted for several days.

Case 16. White male, age 50, known mentally ill eighteen years; hospitalized here two months; diagnosis, schizophrenic reaction. One year earlier, at another hospital, he drank some furniture polish; but on being questioned, then and later, he denied suicidal intent, stating he had mistaken the polish for milk of magnesia. Exactly one year later to the day, he hung himself. In retrospect one could not find any specific significance for both acts being made on the same day, April 25, one year apart.

Case 17. White male, age 40, known mentally ill two years; hospitalized here two months; diagnosis, manic depressive psychosis. Outstanding symptoms were hyper-activity alternating with crying spells. No suicidal ideation was expressed. One evening he placed his rolled-up blanket in bed to simulate a sleeping figure (he was in a seclusion room because of his hyperactivity), stuffed his nostrils with toilet paper, stuffed his mouth with his pajama top, tied the pajama bottom around his neck, and placed himself under the bed with one of the legs of the bed resting on his Adam's apple.

Case 18. White male, age 20, known mentally ill 1½ years; hospitalized here six weeks; diagnosis, schizophrenic reaction (both parents psy-

chotic). He had made two previous attempts while still in service—once cutting his wrist and later by putting his hand into an open fire. However, by the time he came here, he was considered so free of suicidal intent that he was placed on an open ward. Although he had freedom of the grounds, he committed suicide by hanging himself during the night in his room. This was after a hospital dance, where, according to all reports, he was "cheerful, smiling, and having a good time." Two days before he committed suicide, he wrote the following letter to his sister:

> Dear Rose:
>
> I'm feeling a little better. I'm looking at life in a brighter way. Just returned from the movies and saw a nice picture. I'm eating good and I'm working in the Occupational Therapy Shop. Things are looking better for me. Keep well, smiling, and keep writing.
>
> Your loving brother,
> Sid

Case 19. White, male, age 51, known mentally ill for 16 years; hospitalized here eight years; diagnosis, manic depressive psychosis. Some 16 years earlier, prior to his first hospitalization, he made three successive suicidal attempts by 1) drowning, 2) swallowing tincture of iodine, 3) swallowing bichloride of mercury. In his eight years here, he had spent most of that time on open wards, had ground privileges, and was home on frequent, extended visits. One day about noon, he left the hospital without permission and was found hanging from a tree in the woods adjacent to the hospital grounds.

Case 20. White male, age 25, known mentally ill one year; hospitalized here one month; diagnosis, schizophrenic reaction. This patient was considered as possibly having suicidal ideas but was not considered to have a strong potential for acting them out at that particular time. While being escorted across the hospital grounds he impulsively broke away from his escort and almost unbelievably negotiated an eight-foot fence, topped with a barbed wire flare, which surrounded the water tower. With astonishing ease, he climbed the smooth leg of the tower to a ledge 72 feet high and plunged down.

Case 21. White male, age 32, known mentally ill two years, hospitalized here one week; diagnosis, schizophrenic reaction. There were no verbalizations or acts to indicate suicide motivation. He was placed in seclusion room because of hyperactivity. He strangled himself with a strip torn from his pajamas.

Case 22. White male, age 27, known mentally ill three years; hospitalized here one year; diagnosis, schizophrenic reaction. At first he was not considered suicidally inclined and was permitted out on trial visit. He remained out for eight months. The first indication of possible suicidal intent was self-extraction of three front teeth, which act he indicated was somehow related to the Trinity. He then stated: "I must die before Easter or else God will die." He was placed on strict suicidal watch and was seen five times a week for individual psychotherapy. During Easter week he succeeded in effecting his self-destruction. He was squatting in bed smoking a cigarette with his legs folded underneath him. His arms were secured by a camisole and there was a psychiatric aide on each side of his bed. Suddenly, using the bed as a spring-board, he propelled himself over the foot of the bed and flexed his head just before striking the floor. He succeeded in fracturing his cervical spine, with death 48 hours later.

Case 23. White male, age 31, known mentally ill 8 years; hospitalized here four months; diagnosis, schizophrenic reaction, paranoid type. He had never —by act or word—given evidence of suicidal intent. His admission to this hospital as well as a previous one was precipitated by a perverse sexual act. Because of marked confusion, regression and assaultiveness he was confined to a private room. During the night, he strangled himself with a rope fashioned from his bed sheet.

Four of these 11 patients (Cases 14, 15, 21 and 23) fall more or less into the same category as the patients who committed suicide while officially permitted to be out of the hospital, in that they were at no time considered to be suicidally motivated nor was there anything in their recent behavior to indicate suicide. Four of these 11 had made previous suicidal attempts: Cases 13, 16, 18, and 19; respectively, $2\frac{1}{2}$, $11\frac{1}{2}$, and 16 years previously. By almost any criteria, this last case (Case 19), wherein two successive suicidal attempts are separated by a space of 16 years, might be said to be unpredictable in the absence of current objective evidence of the self-destructive drive. Case 18, more than any other case, illustrated the difficulties in evaluating who may or who will commit suicide. A more "normal" or more "cheerful" letter than the one he wrote to his sister would be difficult to find. Case 13 was kept on our most closely supervised ward because of his previous attempts, but since he did not manifest any outward signs of an active self-destructive drive, he was not treated as an acute suicidal problem. His act was an impulsive one and was undoubtedly carried out on the spur of the moment. He had no way of knowing in advance that he would be in a position to carry out the act he did. Case 16 involved a questionable previous attempt. Furniture polish is not ordinarily used in a suicide attempt nor is it likely to succeed.

Case 20 falls in the same category as does Case 13, except for the fact that he had made no previous suicidal attempt. Case 22 was the one patient who was felt to be actively and intently determined to effect his own self-destruction and who succeeded despite all the precautionary measures taken.

Discussion

Of course one could take the stand that once a patient makes a suicidal attempt he should forever after be treated as if he were still suicidally minded. Many years ago that philosophy was prevalent in many hospital circles as witness Whitmire's (20) statement that "patients who have made more than one suicidal attempt should never, so long as they remain psychotic, be relieved of special suicidal precautions." This attitude is neither feasible nor desirable. It is not feasible because there is no satisfactory yardstick for determining what constitutes an earnest suicidal attempt in a psychotic patient. Secondly, there would be a continuous accretion of such patients so that eventually such a large percentage of all the hospital patients would be on suicidal precautions as to dilute to insignificance the meaning of that measure. To illustrate the undesirability of such an attitude, the writer reviewed 50 case records at random from among the patients on our open ward who have resided here for 15 years or more. Seven had committed two or more acts which could be interpreted as suicidal—putting hands through window panes, striking heads against walls, episodes of crying, refusal to eat, verbalizing an attitude of indifference to continued living—early in their period of hospitalization. Since all of these are still psychotic, they would have remained all these years on suicidal observation status had we followed Whitmire's injunction. Instead they have been able to adjust adequately on open wards enjoying all the privileges granted such patients, at the same time permitting us to concentrate our personnel resources on such patients as require them more realistically.

The act of suicide has been a part of man's behavior at least as far back as recorded history. There are two opposite schools of thought as to whether the act of taking one's own life, in itself, constitutes a psychotic act. There are those who emphatically say, "Yes" (Sir Hubert Bond (2): "My belief is so firm as to amount to a strong doubt as to the existence of a sane suicide"), while others as emphatically say, "No" (Maudsley (11): "Just as madness may exist without suicide, so suicide may take place . . . in a healthy mind"). I believe it is possible to correlate both these views by accepting the Freudian concept that there exists a death instinct in all humans, after which the answer to the question of "Who may be suicidally inclined?" is an obvious "Any one of us."

That more of us or even all of us do not commit suicide in view of the universality of the death instinct is due to the concomitant life instinct. These two instincts are in constant conflict and interaction with each other. Each person evolves a "modus vivendi" between these two forces but, to quote Menninger (12), "No one evolves so completely as to be entirely free from self-destructive tendencies." For confirmation of this, we need but pick up the paper in any large city, on almost any given day, and be assured of seeing an article wherein is described a suicide in a person who up to that time was described as "normal" or "carefree and happy" or "having everything to live for."

Just as the law of gravity applies equally well to the psychotic and the nonpsychotic alike, so do the laws of human behavior. What differs in the two categories is not the basic drives but rather what happens to these basic drives as a consequence of each individual's life experience. There are no large suicide statistics to substantiate this but all the indications are that the rate of suicide is materially higher among psychotics as compared to nonpsychotics. Apparently the world of unreality to which they have retreated is, at least to some, even less acceptable than the world of reality which they have forsaken. Then too, we know that psychotics are governed more by primitive and infantile drives without the benefit of a strong controlling ego capable of judging and weighing contemplated acts and are, therefore, more likely to carry out a suicidal act impulsively.

Contrary to what is generally believed to be so, the suicide rate is not on the increase. Statistics show a rate of 13 per 100,000 in 1911

TABLE 3

NATIONAL INCIDENCE OF SUICIDE EXPRESSED IN RATE PER 100,000 (19)

1911	13	1931	14.1
1912	13.6	1932	14.9
1913	13.6	1933	13.8
1914	13.6	1934	13.8
1915	13.9	1935	13.1
1916	12	1936	12.7
1917	12.8	1937	14.6
1918	12.6	1938	13.2
1919	11.6	1939	12.8
1920	10.2	1940	13.2
1921	12.2	1941	12.6
1922	11.7	1942	14.7
1923	11.4	1943	10.2
1924	12.1	1944	10.1
1925	11.1	1945	10.7
1926	11.4	1946	10.2
1927	11.1	1947	11.1
1928	13.1	1948	10.4
1929	12.8	1949	11.2
1930	12.9	1950	10.7
40 year average			12.2

and a rate of 10.7 per 100,000 in 1950 for the United States as a whole. The national suicidal rate for the forty-year period between 1911 and 1950 was 12.2 per 100,000, while for the year 1950 alone, it was 10.7 per 100,000. As will be seen from the accompanying chart (table 3), there was a definite rise during the depression years and a definite fall during the years of World War II. Throughout the years, there is almost a fixed ration of three males to one female who commit suicide.

Just as love and hate, passivity and aggressiveness, and sadism and masochism are, so to speak, opposite sides of the same coin, so are suicide and homicide and all its variants; the difference being that in the former, the aggression is internalized, whereas in the latter it is externalized. Statistics seem to bear out that where the homicide rate is high, the accompanying suicide rate is low and vice versa. Durkheim (4) showed that for the years 1891-1895 the relationship between suicide and homicide in Spain was in a ratio of 1:3, whereas for the same years in France, it was 10:1. That the super-ego plays some part in determining frequency of suicide is seen in the fact that where it is condemned (as in Catholic countries) it is relatively low while where it is condoned or exalted (as among the Japanese), it is relatively high. In the United States, the ratio of suicide to homicide is roughly 2:1. In our 23 cases there was a remarkable absence of aggressive behavior directed outwardly.

As to prevention, certainly one ought to remove from the environment of all hospitalized active psychotics such accouterments as would readily lend themselves to a suicidal attempt. But there is a limit to what one should be willing to eliminate, for, in the final analysis, it is impossible to create an environment wherein all possible means of self-destruction are eliminated. In 1931 the Manager of this hospital, then, as now, Dr. Winthrop Adams, after an inspection tour of the grounds, made the recommendation that a steel ladder attached to one of the legs of the water tower be removed and a tall fence built around the base of the tower for, as he saw it, "that was an invitation to suicide." Fifteen years later, despite that wise forethought and the corrected situation, a patient (Case 20) nevertheless utilized the tower for his own destruction.

However, after all physical precautions have been taken, the ultimate reduction of suicides must depend on the alertness and sensitivity of supervising personnel to the mood, expressed thought content and behavior of each individual patient. Where there are no warnings whatever, one can no more prevent suicide than one can prevent a person with no previous indications of cardiac pathology from developing a coronary attack. Where there are warnings, the necessary measures to be taken are self-evident and relatively simple.

CONCLUSION

1. Many psychotics give no more advance, notice by appearance, word, or behavior of their intent than do non-psychotics.

2. It is possible to cut down materially the suicidal rate among psychotics by heeding the warning signals (mood, expressed thoughts and behavior), but it is impossible to reduce that rate to zero even if one were willing to forego and eliminate all the niceties and privileges allowed—slowly and against the resistance of the ultra-conservatives—over the years to patients hospitalized for psychiatric illness.

3. It goes without saying that the greater the number of personnel and the better their

state of orientation and training, the more effective will be the suppression of suicide, everything else being equal.

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THE USE OF ANECTINE (SUCCINYL-CHOLINE-CHLORIDE) IN ELECTROCONVULSIVE THERAPY—A SIMPLIFIED TECHNIQUE

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In the present state of development of psychiatric knowledge and available therapy for emotional disorders, electroconvulsive therapy is an important part of our therapeutic armamentarium. Attendant with its use, however, is the risk of orthopedic trauma. Various methods and medications are utilized in an attempt to reduce the incidence of this complication. The use of curare in electroshock treatments was reported in 1947 by Hobson and Prescott providing a more satisfactory control of the convulsion.

The respiratory effects of curare were still too long-lasting for the security it offered from fracture damage. Attenuation of dosage made results unpredictable. Many felt that the barbiturates with their relief of anxiety, partial relaxation, and ease of administration were to be preferred to curare even though increased electrical stimulation and the nuisance of petit mal seizures were encountered in their use.

In 1949, Bovet et al, (4) wrote on synthetic curarizing drugs of the bischoline esters of succinic acid emphasizing the ultra-rapid induction of paralysis and the brief duration and uncomplicated recession of their effects. Independently, Buttle and Zaimis (6) in Great Britain reported on these powerful, brief-acting neuro-muscular blocking agents. Of these agents, succinylcholine has proved most satisfactory in the production of relaxation and in the absence of toxic effects.

It is interesting to note that succinylcholine was first synthesized by Hunt and Taveau (17) in 1911. The pharmacology was studied by Castillo and de Beer (7) in 1950 and given clinical trial in surgical operations and electroconvulsive therapy in 1951 chiefly by Thesleff, Von Dardel, Holmberg and Brücke (5, 16, 22-25).

As yet there does not seem to be any medication that fully satisfies the criteria of an ideal muscle relaxant. In our opinion, the minimum criteria for such a drug are: 1) that it may be used with safety to the patient; 2) that it produce sufficient relaxation, in therapeutic doses, to prevent orthopedic morbidity; 3) that the drug be short acting, especially in its influence on respiration; 4) that the technique of its use be simple and rapid enough to be easily adapted to a multiple treatment schedule (such as found in larger hospitals); 5) that it have no undesirable physiological side effects and no unpleasant subjective recall by the patient; and 6) that the use of the drug does not reduce the beneficial effects of the therapy nor prolong the length of the treatment series required for satisfactory clinical response. We feel that Anectine very closely fulfills these criteria when used in the manner to be described.

In electroconvulsive procedures succinylcholine has been used in various dosages and in combinations with atropine and pentothal. These were injected in the same or separate syringes and with several variations in timing. Oxygen inhalation to the point of saturation before shock and positive pressure oxygen postshock, or both, have also been used. These elaborate methods required the skilled services of a trained and experienced anethetist. Atropine served to minimize the risk of cardiac arrhythmias and impaired circulation. Pentothal allayed the anxiety from the sensation of suffocation resulting from the succinylcholine but at the cost of prolonging the respiratory depression and the return of consciousness of the patient. Apnea extending up to three hours has been reported by others using succinylcholine (10, 13, 14, 18). The dosage of succinylcholine varied from 20 to 50 mg., with the timing of great importance. The proper time interval was usually measured by the loss of the ability to lift the eyelids, snap the fingers, maintain extension of the arm, or grip the hand, and was approximately 25 to 35 seconds after the injection.

These methods, though serving the purpose

of reducing orthopedic accidents, nevertheless have not been without danger to the patient (20). Two fatalities have been reported by Kalinowsky. They are all elaborate, time-consuming methods still requiring a staff team of many nurses, attendants, doctors, and anesthetists. This paper is written to describe a simplified technique of the administration of succinylcholine in electroconvulsive therapy. This technique was developed independently of another investigator (Neville Murray) who recently reported on a similar method.

Description of Technique

We have continued to use the same general technique as was used by us prior to the work with Anectine. A team of five persons is utilized in holding the patient. One of these is placed at each side of the patient holding the hip and knee, one is on one shoulder, one holds the mouth-gag with one hand beneath the pillow holding the head in flexion and an elbow supporting his own weight on the paitent's shoulder, and the fifth member operating the source of electricity. A machine designed by W. Gilson and manufactured by the Burdick Corporation producing a typical 60 cycle uniform spike wave of the Cerletti-Bini type is used. Due to the very rapid action of Anectine, it is necessary that everything be in readiness and the electrodes in place and connected before the Anectine is given.

The Anectine is then given intravenously in doses of 10 to 15 mg. without dilution. No premedications or special preparations are used. This is in sharp contrast to the techniques described for use of this drug by earlier writers. Only occasionally has it been necessary to use more than 15 mg. (¾ cc.), and never more than 20 mg. (1 cc.). The usual dose is 10 mg. Our experience suggests that there is relatively little relationship between required dosage and the size of the patient. We have found, however, that in order to obtain the fullest effects and most desirable results, the material must be injected as rapidly as possible. We prefer a .22–.18 gauge needle, the larger bore facilitating the rapid injection which we feel produces with small doses an effect, adequate for the brief period of electroshock treatment, equal to or greater than larger doses slowly injected and without the attendant recovery problems.

The most important feature of our technique is the timing of the administration of the electrical current. This is given when there is 1) definite evidence of twitching of the facial muscles — especially around the mouth and eyes and 2) obvious respiratory embarrassment —or both. The latter seems to be the most significant sign. Contrary to expectations, there is rarely recall of this sensation by the patient, if unconsciousness is produced as soon as this sign is present. In those that do occasionally recall it, the complaints are minimal and have never prevented a patient from voluntarily continuing treatment. The period of time after injection that it takes for these signs to develop varies from five to ten seconds to as high as 60 seconds, but most commonly ten to 15 seconds. This seems to be an individual patient factor, and any attempt to standardize the time necessitates using the upper limits. This results in frequent complaints of unpleasant subjective sensations from the patients who react more quickly. When properly performed, the period of apnea from the drug corresponds nearly exactly to the period of apnea from the convulsion, and respirations resume spontaneously immediately following the end of the grand mal.

Oxygen and a mask with bag and an oral airway are on hand at all times as precautionary measures, but only on occasion has artificial respiration for a short period been necessary. These instances were in individuals having liver damage. Although not having occurred in our experience, insecticide poisoning (1), drug idiosyncrasy, and malnutrition may cause delayed recovery.

Results

This report covers a series of 112 consecutively treated cases in which electric shock therapy was felt to be the treatment of choice. Inasmuch as our purpose is to present a technique of electric shock therapy and its safety, no attempt will be made to validate the criteria for diagnosis and treatment. The group consists of 54 (48.4%) females and 58 (51.6%) males. The maximum age was 75 years and the minimum age 16 years, with an average of

44.8 years. The discharge diagnosis was schizophrenic reaction (all types) in 41 (36.6%) cases, and depressive disorder in 51 (45.5%) cases. The remaining 20 (17.9%) cases covered a group of miscellaneous diagnoses including involutional psychotic reactions and manic phases of manic depressive disorders.

A total of 1039 treatments (grand mals) were administered this group, of which 972 were done with Anectine as relaxant. The non-Anectine treatments were done with Intocostrin (Squibb) used as relaxant. These cases were early in the accumulation of our experience with Anectine when the patients were given their course of treatment partly with Anectine and partly by means of our former technique. We very rapidly changed to the exclusive use of Anectine, however, and in this series 103 cases have been treated with Anectine alone. The average number of grand mals per case has been 9.3 with a maximum of 20 and a minimum of three. The few instances of such a low number of treatments result from patients leaving the hospital against medical advice.

In addition, 201 petit mals have occured during the course of treatment, bringing the total number of treatments to 1173. Statistically these must also be considered inasmuch as the sudden tetanic muscular contraction occurs with a petit mal as well as with a grand mal (with the machine and technique of convulsive therapy used by us).

Excellent muscle ralaxation has been obtained in all cases. It has been necessary to vary dosage upwards or downwards according to individual susceptibility; however, in no cases have we used less than 5 mg. or more than 20 mg. to obtain optimum result. The grand mals obtained are so gentle that on occasion it is necessary to palpate the extremity for the rhythmic, clonic contractions to determine positively that the patient was experiencing a grand mal. It has been learned that, under these circumstances, the facial muscles give reliable evidence of the clonic phase even when no visible movement is present in the extremities. There is little difficulty in distinguishing these gentle convulsive movements from the muscle fasciculations that result from the rapid administration of the Anectine for the latter are not generalized nor do they involve whole muscle groups and the rhythmical pattern is not present. The occurrence of a petit mal can be detected and differentiated from the extremely mild convulsions by the swallowing, resumption of breathing, and the absence of any palpable or visible clonic movements.

There has been no orthopedic morbidity in the entire series with one possible exception. One case, a very large, muscular male, suffered a cortical infraction of the neck of the right humerus on his first treatment day. This patient had an extremely high convulsive threshhold and experienced several petit mals before a grand mal was obtained, the majority of the treatments that day being given after the effect of the first Anectine injection had worn off and without any subsequent injection. We, of course, are in no position to state definitely when the injury occurred in this case. Interestingly enough, treatment was not interrupted. It was continued with Anectine and the course completed with no further damage to the cortex of the humerus and with no retardation in the ultimate healing and functional recovery from the orthopedic trauma. We include this case because no case in which Anectine has been used has been eliminated.

Other than this case in which there is serious question whether or not the damage occurred during the effect of Anectine, there has been no incidence of orthopedic complications. This is certainly a significant increase in the safety of electric shock treatment from an orthopedic standpoint when compared with our previous experience and with that reported in the literature.

There has been one instance of prolonged apnea following the grand mal which required artificial respiration for a period of five minutes before normal exchange resumed. This man was a psychotic depression with a long history of alcoholism and a moderately enlarged liver. Liver function tests were on the borderline of normal. The presence of an old coronary infarct made us feel it unwise to subject him to further risk; thus the remainder of his treatments were done with Intocostrin as relaxant, with satisfactory recovery.

Other instances of apnea of very short periods are not uncommon, particularly early in

the course of treatment during which time the dosage is adjusted to the patient. In our experience, a short period of manual artificial respiration with the patient remaining supine has proved adequate. Oxygen is usually administered during this period and mask, bag, and airway are available should a prolonged apnea ensue. The very short period of action of the drug prevents this from being a serious problem except in the patient who is excessively sensitive. In each case that has given us any trouble there has been evidence of liver pathology, either clinical enlargement or impairment of liver function tests or both, with either old age or a long history of alcoholism in the background. Since impairment of liver function results in a low cholinesterase blood level and thereby a delayed rate of destruction of Anectine, whenever there is any reason to question the status of the liver, it is well to do thorough liver function tests before proceeding with treatment. If significant impairment is detected, Anectine should not be used. Recent excessive alcoholic or barbiturate usage without liver damage may, on the other hand, render the patient more tolerant to the effects of Anectine; and higher dosages are required in these patients.

No statistical attempt has been made to compare the therapeutic results in patients given Anectine with patients treated with our previous Intocostrin technique; however, there has been no apparent difference in the number of treatments required to bring about a satisfactory clinical response using Anectine from the number required previously. None of the various members of the staff whose patients have been treated with this method have noted any alteration in their responses therapeutically and all have been pleased with the safety, simplicity, and decreased morbidity.

Comment

The scope of treatment by electroconvulsive therapy has markedly broadened with the use of this method, since there are practically no concurrent physical disabilities that constitute an absolute contraindication to therapy. Cases of spastic paraplegia and severe rheumatoid arthritis with multiple joint involvement have been treated without adverse effect. A rather large number of the cases had mild to severe degenerative disease of the spine and were treated without adverse effect. Eleven cases had moderate to severe osteoporosis involving the spinal column, as well as the extremities. These were treated without mishap. A number of cases including degenerative diseases of both hips, spondylolisthesis, spina bifida, as well as old compression fractures of the vertebrae were treated without harm. In one instance, treatment was started with no medication at all with development of a moderate compression fracture of D-4 and D-5. Treatments were continued using Anectine with no progression in the x-ray evidence of fracture and gradual disappearance of the local pain during the course of treatment.

The one instance of a cortical infraction which we report is not felt to have occurred during Anectine effect and thus need not detract from the otherwise perfect record Anectine has accumulated. As a result of this case, however, we feel that, if more than one grand mal is to be given on a treatment day, or, if a number of petit mals occur before obtaining a grand mal, one should reinject with Anectine when the time elapsed has exceeded two minutes.

Many different cardiac diseases have been treated without harm to these individuals, either from a clinical or electrocardiographic standpoint. These cases include auricular fibrillation, bundle-branch block on an arteriosclerotic basis, several old, healed myocardial infarctions, and many with borderline to moderate coronary insufficiency. Preshock atropine has not been used in any of our cases.

The development of anxiety in anticipation of the next treatment is a not infrequent experience of patients during a series of electroconvulsive treatments. This appears to be primarily a psychological reaction of the patient. When Anectine is used, however, some instances of this anxiety may be on a very realistic basis. If the respiratory embarrassment and sense of suffocation that develops following Anectine injection is allowed to exist too long before loss of consciousness is produced by the electrical stimulation, the patient will remember it and have a realistic basis for fear of the next treatment. Such a situation occurring in a patient prone to development of anxiety anyway further increases the difficulty

in dealing with such a patient. This can be avoided by careful attention to the timing of electrical contact, there being apparently sufficient retrograde amnesia to prevent this from becoming a problem. On this we differ in opinion with Holmberg and Thesleff as well as Curran and Ferguson.

Summary and Conclusions

1. A technique of administration of electroconvulsive therapy using Anectine as muscle relaxant has been described.

2. Anectine used in the manner described is both simple and safe to use.

3. The use of this technique has reduced the orthopedic morbidity to zero in our series (with one questionable exception) and has resulted in no serious complications.

4. With this technique the number of patients who may be given electroconvulsive therapy with safety is significantly increased.

5. Impairment of liver function increases the risk of complications resulting from the administration of Anectine; thus, when any doubt exists, thorough liver function studies should be done prior to treatment. Anectine should not be used, if definite evidence of impairment is present.

6. With the method described, there has been no adverse effect upon the therapeutic response, nor has there been an increase in the number of treatments required for response.

Grateful acknowledgement is made of the professional interest and assistance of Dr. Judith Walton and advice of Dr. Anne Bardeen Henschel, both of whom contributed materially to the practical development of this technique.

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SEXUAL EXPERIENCE AS A PROGNOSTIC FACTOR IN PSYCHOSIS[1]

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PROBLEM

Numerous studies have investigated the factors influencing the prognosis for psychotic patients. Bellak (1) in summarizing the literature through 1946 listed the following factors usually considered as relevant to poor prognosis in schizophrenics: 1) Schizoid or "shut-in" type of pre-morbid personality; 2) Onset during adolescence or after age of 40; 3) Previous psychotic episodes; 4) Duration of present psychosis more than one year; 5) Family history of psychosis and/or neurosis.

Good prognostic indices are: 1) A sudden onset; 2) Catatonic symptoms; 3) Presence of confusion; 4) Duration of less than one year; 5) Average or higher intelligence; 6) Relief of symptoms following injection of sodium amytal; 7) Conspicuous precipitating factors. Sexual experience as a prognostic factor was not listed.

In another study, Wall (6) concluded that an interest in sex preceding or during the psychotic illness was a good prognostic index. Malamud and Render (4) felt that those patients who had been or were married had a better chance of recovering than those who had not. Conversely Chase and Silverman (2) and Rennie (5) report that a knowledge of the patient's sexual experience was of little prognostic aid. A survey of the literature reveals an emphasis on the role of sexual perversions rather than socially acceptable sexual habits. Also much of the literature records "impressions" rather than statistical research. Commenting on this Kant (3) points out the need, ". . . of obtaining reliably objective methods (and criteria) for prognosis. Today (1944), however, we are still far from reaching this goal . . ." Certainly this comment is not as applicable today but should be a constant guide in recording and reporting such observations.

The study reported here was judged to have at least three values: 1) The literature reports few and contradictory findings concerning the influence of pre-psychotic *normal* sexual behavior as a prognostic factor. 2) The criteria of sex behavior are objectively defined. 3) A large sample (330) cases and statistical evidence are utilized.

The present study investigated the role of sexual experience as a prognostic factor among 330 psychotic patients hospitalized at Fitzsimons Army Hospital. Table 1 lists the final diagnoses. As can be seen 276 or 83.6% were diagnosed as schizophrenic. Forty-four or 13.3% were diagnosed as "Psychotic Reaction" with various other manifestations. Of this latter group all but those associated with chronic alcoholism were viewed as atypical schizophrenic reactions. Those diagnosed as psychotic reactions with physical etiology were patients who became demonstrably ill when excessively fatigued after going for several days without sleep. (This diagnostic grouping does not imply organic brain damage.) Of the 330, 67 went to duty, 220 were sent home to their own care, 34 went to the VA for further treatment and care, and 9 had miscellaneous dispositions. On the basis of patient histories, sexual experience was measured from three dimensions: 1) incidence of dating, 2) marital history, 3) incidence of heterosexual intercourse. The data in these areas were obtained from an extensive social history compiled in each case by both a physician and a trained social worker. In every instance an effort was made to obtain as much information as possible regarding the patient's interaction with the opposite sex. Frequently data were obtained

[1] This study was conducted at the Neuropsychiatric Service of Fitzsimons Army Hospital. The authors are indebted to Lt. Col. Oswald M. Weaver and Lt. Col. William H. Anderson for their advice and assistance in the preparation of this study.

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TABLE 1

DIAGNOSIS FOR PSYCHOTIC GROUP

Diagnosis	*Number*
Schizophrenic reactions	276
simple type	10
hebephrenic type	7
catatonic type	31
paranoid type	71
latent type	16
not elsewhere classified	141
Psychotic reactions	44
not elsewhere classified	24
with physical etiology	9
with chronic alcoholism	5
with psychopathic personality	3
depressive reaction	3
Character disorder with transient psychotic episode	3
Paranoid state	2
Psychosis with mental deficiency	2
Manic-depressive, manic phase	2
Manic-depressive, depressed phase	1

after the patient had recovered from the psychosis but in some instances this was obviously not possible. In the majority of cases, especially those going to the VA for further care, a thorough social history was obtained from the patient's family by a worker in the patient's home community.

As might be expected, the data as to incidence of dating and the marital history can probably be considered as fairly reliable. We recognize that the information as to heterosexual intercourse is not as accurate. Even with individuals who are not psychotic such data are of questionable validity. This, however, is a problem difficult of solution, for even when considerable attention is paid to training the interviewers to a standard technique (Kinsey and coworkers) criticism is still leveled at the method. We recognize the limitations in attempting to obtain reliable information in this area. We cannot attest to the patients' veracity in each instance. However, our data represents the answers the patients provided when asked questions regarding this matter and may, in reality, be a reflection of both the actual events in the patient's life and his attitudes towards sex.

Treatment was measured by the number of electric and insulin shocks the patients received during their hospitalization at Fitzsimons Army Hospital. No attempt was made to indicate the number of actual comas resulting from insulin treatment because it was noted that absence of insulin coma was rare. The decision as to the type of treatment administered rested upon the usual criteria and indications.

Disposition was made on the basis of a decision by a board of psychiatrists after review-

TABLE 8

BIOGRAPHICAL COMPARISONS AMONG THE "SEXUAL EXPERIENCE" GROUPS

Biographical Factors	*Sexual Experience*						
		Incidence of Dating				*Intercourse*	
	Total	*Never*	*Rare*	*Often*	*Married*	*Yes*	*No*
Number of cases	330	33	48	174	75	257	73
Age (years)							
range	17–44	17–28	20–38	20–39	19–44	20–44	17–35
mean	25.2	22.1	22.9	24.2	29.8	26.1	22.1
Education (years)							
range	2–20	6–14	4–14	4–16	2–18	2–18	4–20
mean	10.3	9.6	10.2	8.8	12.5	10.1	11.2
Service (months)							
range	1–276	1–84	3–112	8–173	4–276	3–276	1–97
mean	50	33	41	54	73	66	33
Hospitalization							
range (days)	7–433	22–281	39-320	7–374	62–433	11–389	7–291
mean (days)	140	163	142	96	159	137	143
Race							
White		26	36	162	66	234	54
Negro		7	12	12	9	23	19

ing each case and interviewing the patient. Four categories of dispositions were possible: 1) return to military duty, 2) discharge from military service to own care, 3) discharge from military service and transfer to a VA hospital for further treatment and care, 4) miscellaneous (e.g., transfer to other military hospitals, deaths, return to confinement).

Of primary importance in the board's evaluation was the state of remission, the reasonable desires of the patient, his length of service, and possible special skills and technical experience the soldier might possess. Table 2 presents relevant biographical and background data among the sub-groups studied. The only statistically significant difference is between the mean ages of the groups reporting heterosexual experiences. The influence of age upon the equality of opportunity to experience the behavior measured (heterosexual intercourse) may appear to be important but this is minimized by the fact that statistical analysis (Student's "t") reveals no significant differences among the mean ages of the dispositional groups. Thus age was apparently not a factor in disposition among the groups studied.

Results

The criteria for placing men in dating groups were 1) *Never*—no reported dates with opposite sex. 2) *Rare*—three or less dates with opposite sex. 3) *Often*—more than three dates with opposite sex. 4) *Married*—reported marriage.

The statistical results of this study are presented in three figures and three tables.

Figure I shows the comparison of mean number of somatic treatments (EST and IST) among the groups, according to dating behavior. Noted is the consistent reduction in mean number of EST and IST treatments as the incidence of dating increased. Thus there seems to be an inverse relationship between the number of treatments and the number of dates.

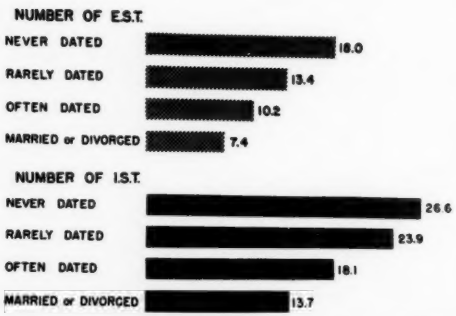

FIG. 1. Average number of treatments per patient vs. type of sexual adjustment.

The significance of this relationship is shown in table 3. It will be noted that the differences between the means are significant at either the 0.05 or 0.01 level of confidence for all comparisons except those between the "never—rarely dated" (IST) pairings. The "dated" group includes all those in the "rarely," "often dated" and "married" groups. The "dated" group was designated in order to present a more clear cut distinction in terms of dating behavior, i.e., simple presence or absence of dating.

A graphic illustration of the dispositions of the various dating groups is presented in figure 2. Here again can be seen the consistency of more favorable (duty) disposition with an increase in dating frequency. The relationship is direct, the more frequent dating groups went back to duty at a proportionally higher rate. A statistical analysis (comparison of percentages going to duty) between the never dated group and the three other dating groups indicates levels of confidence at 0.05 and 0.01 levels for all but the "never dated—rarely dated" comparison.

Figure 3 illustrates the dispositions according to presence or absence of heterosexual in-

TABLE 3

CRITICAL RATIOS BETWEEN SEXUAL EXPERIENCE GROUPS BASED UPON DIFFERENCES IN MEAN NUMBERS OF TREATMENTS ADMINISTERED

Groups	*EST Never dated (N–33)*	*IST Never dated (N–33)*
Rarely dated (N–48)	2.13*	0.65
Often dated (N–174)	3.72†	2.20
Married (N–75)	4.09†	3.85†
Dated (N–297)	2.85†	2.54*

* Significant at 0.05 level.
† Significant at 0.01 level.

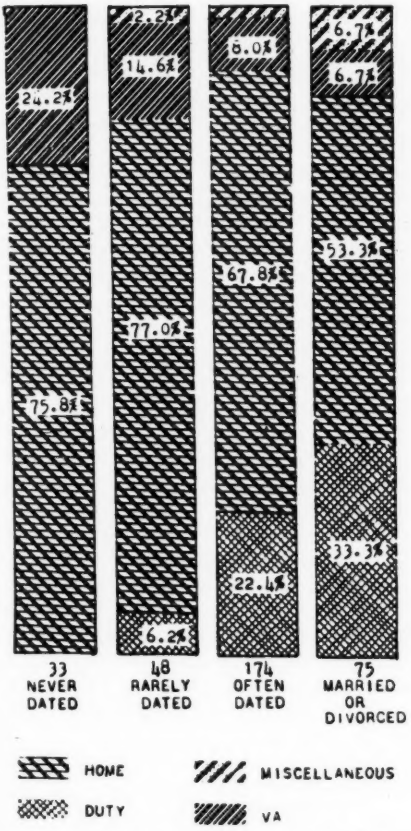

FIG. 2. Disposition vs. type of sexual adjustment.

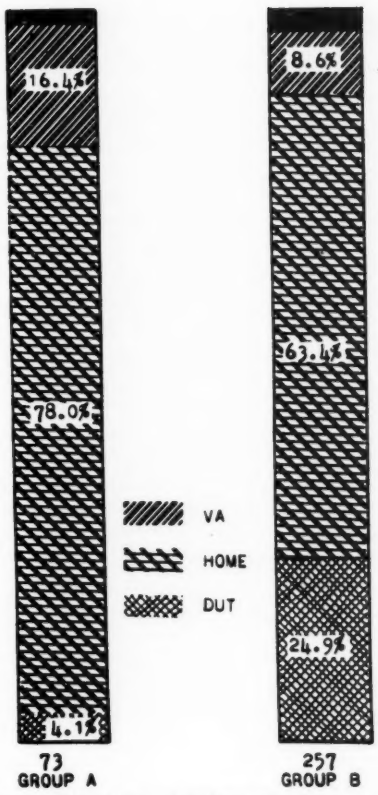

FIG. 3. Disposition of patients who have not had (Group A) and those who have had (Group B) heterosexual intercourse.

tercourse. This relationship is shown as another measure of sexual experience. A comparison of the proportions of duty and home dispositions with incidence of heterosexual intercourse results in critical ratios of 5.60 and 3.54 respectively. These ratios are significant at the 0.01 level with the presence of intercourse in the history favoring a better disposition.

CONCLUSIONS

1. On the basis of data in this study, it would appear that those individuals who have had more extensive dating experience require fewer somatic treatments and are more likely to be returned to military duty in the event of a psychotic illness.

2. Those patients who report having had heterosexual intercourse seem to have a more favorable immediate prognosis than those who deny such experience.

3. Age, schooling, length of service and duration of military hospitalization do not appear to be influential factors in the disposition of psychotic military personnel.

DISCUSSION

As a result of our experience we feel that the Army General Hospital setting presents opportunities not afforded civilian psychiatry for the study of psychotic illness. This advantage has come about only in recent years with more extensive treatment being afforded the patient at this level. Formerly the policy was to transfer an individual to the Veterans Ad-

ministration as soon as a diagnosis of psychosis was established. During this study the usual treatment methods except for psychosurgery, psychoanalytic therapy and prolonged custodial care were available and utilized.

In civilian life disposition can be broken down into only two distinct, clear-cut groups: 1) continued hospitalization or 2) discharge from the hospital. Other criteria of recovery have been proposed but tend to be vague and not generally agreed upon. In the army setting we have three distinct possibilities as to disposition: 1) return to a duty status, 2) return home (discharge from the Army to own care) and 3) transfer to the VA for continued hospitalization. Return to duty was utilized only with those individuals who appeared to be in the best possible state of remission. Little or no pressure was put on these patients to return to duty. Thus those returning to duty are considered in the best state of remission, those going to the VA, in the worst. Those returning home are comparable to patients discharged to own care from civilian hospitals.

It has been noted by other investigators that a premorbid schizoid adjustment leads towards a more malignant prognosis in the event of a psychotic illness. The term schizoid is at best vague and difficult to define. On the other hand, dating experience is much easier to define and is readily broken down into progressively more active groups. Dating and reported sexual experience can be dealt with statistically while groups based upon degree of schizoid adjustment are very difficult to so treat, inasmuch as the latter determination is so much more subjective and more easily influenced by the investigator's personal experiences.

As can be seen from our data those individuals who dated more and those individuals who reported sexual experience require less somatic therapy and there is a greater likelihood of the individual being in a sufficient state of remission to return to duty following treatment. Those individuals with no dating experience are more likely to go to a VA Hospital. However, because of the relatively small number of cases in the VA group, statistical analysis was not possible and the differences can be viewed only as a trend.

Our findings do not establish that individuals who date rarely if at all or who have not had intercourse are more prone to psychosis. Another type of study would be required to refute or establish such an hypothesis. However, our data would seem to indicate that increasing involvement, either sexually or socially, with the opposite sex prior to a psychotic break leads to a more complete immediate recovery with less treatment.

Summary

The case histories of 330 psychotic servicemen admitted to the Neuropsychiatric Service of an Army General Hospital were reviewed for incidences of dating and reported heterosexual intercourse. The prognostic significance of pre-psychotic sexual experience was determined by comparison with response to somatic type treatment and discharge disposition. Statistical analysis (differences between means and proportions) seemed to indicate for this group of patients that the greater the degree of social interaction (as measured by normal sexual behavior) prior to psychosis the more favorable the prognosis: i.e., fewer treatments needed and more favorable disposition.

The prognostic value of reported pre-psychotic sexual experience and the need to measure such objectively are discussed.

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CONCERNING THE SEXUAL DISORDERS OF PARENTS AND THEIR CHILDREN[1]

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Anyone who has had clinical contact with psychiatric facilities to which children are brought knows the broad variety of impulsive behavior they present in both sexual and apparently non-sexual acts. Anyone who makes it a regular practice to interview an impulsive child's parents may and does become aware of some connections between such a child's behavior and the attitudes and behavior of his parents. Those who for practical and theoretical reasons in any therapeutic efforts with such clinical problems of children regularly include concomitant therapeutic work with *both* parents, are becoming more and more convinced of an ever-present, intimately etiological, connection (2, 5, 8, 17, 9-14). One day a fuller chapter will be written from such therapeutic studies of families about the details of these connections in the whole range of the psychopathological spectrum: from impulsive disorders through the neurotic illnesses to the psychoses (4, 15, 20, 21, 18). Some of us, like Dr. Adelaide Johnson and her coworkers (3), have already much clinical experience, only some of it recorded in the literature. What there is recorded of it, not much of it is in the psychoanalytic journals. More of it is being "recorded" in the training experience of many young psychiatrists who are learning to work with parents as well as with the child. This is perhaps more generally true in psychiatric clinics for children, but also in other centers where analysts-teachers bring to their teaching such background from working with parents of child patients.

There are good reasons for this paucity of literature. To work therapeutically with three people rather than with one requires time, often collaborators, as well as clarification of technical, therapeutic principles and procedures deduced from these principles. Collaborators of equal training and sufficient sympathy to the idea not to allow ambivalences to cloud one's vision of the import of clinical data so obtained are difficult to find and to keep together working in the same therapeutic community. Often, then, one needs to train a team, which takes many years (19). Results of the work of such a team may not be, and in some respects cannot be, regarded as wholly and strictly comparable to clinical data obtained by the classical psychoanalytic method. Some of these teams work in clinics where frequency of sessions with patients is low and where elementary psychotherapeutic procedures have to be learned and taught to a constant stream of psychiatric trainees.

Yet it would be an error wholly to disregard clinical data and results obtained under these circumstances. Although frequency of therapeutic sessions may be low, the total duration of therapy may be long enough and some of the therapeutic skill found among the more experienced members of such teams may partially compensate for whatever deficiency there may be in such work as compared to psychoanalysis by formally well-trained and more experienced analysts. Careful compilation of the life history of the child correlated with the more readily recollectable events of the total family history, together with the ante-marital history of each parent, makes available the *facts* of the child's *actual* experience especially in the first two or three years of his life as a more reliable source of data than reconstructions based on data in analysis. The contrast between the unconscious intrapsychic elaboration and/or distortion by the child of these events and of the thus better known *actual* attitudes of his parents is then more apparent and better grounded in empirical observation. The therapeutic work of each member of the family with one or several therapists reviewed fre-

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quently and collated with the effects of such work, not only upon his own behavior but upon that of other members of the family, offers an operational check of hypotheses that is in some measure comparable with that of the classical psychoanalytic method (1, 22).

In brief, when the transferences of each parent and the child begin even to be loosened in such therapeutic work, the release of even small amounts of energy from internalized conflicts in any one member of the family at times results in potentiating effects within the family which offer at times dramatic validation of postulated relations of symptom-formations or exacerbations in all three: child, mother and father. This does not mean that therapeutic work in especially the more severe disorders can be shortened for thorough resolution of conflicts. It often does mean that such concomitant work with all three tends to reduce the more durably destructive effects of intercurrent crises upon the personality development especially of the child. Now and then it permits not only the reduction of *on-going* neurotic fixations, but also reversal of the neurotic processes when methods of approach with one member of the family have failed or have proved insufficient to do so (22, 3).

For all these reasons and others which cannot be discussed because of limitations of space, I think consideration of some impressions and of some clinical data derived from what is usually known as "psychotherapy" as distinct from "psychoanalysis" may be of interest to both psychoanalysts of adults and child psychoanalysts.

As an example of one kind of sexual problem seen in such clinics, I would like to sketch very briefly the clinical data of the staff's contact for about nine months with a 15-year-old girl and both of her parents.[3] Within five or six days after severe phobias about going to school, of death and of leaving her mother developed in the daughter, a very anxious mother brought this second of her five children to the clinic. Therapeutic work with all three, each being seen once a week by the same therapist, began about a month later after several exploratory interviews. In the context of decreasing family income, father's rather premature ejaculations, mother's lack of orgasm and much quarreling between them, the daughter, who felt herself uglier, less intelligent than, and envious of, her seventeen year old sister, had begun secretly to have sexual relations with a boy four years her senior who was "a big wheel" in school. She experienced no orgasm with him but a great sense of pride and power, and at the same time she felt extremely guilty about her sexual activity and her provocativeness and fearful that only her compliance with the boy's sexual demands would keep him interested in her. She hated her father who had once told her that her mother had been sexually promiscuous and "no good" before marriage. Although the initial phobias centered around staying near her mother and preventing the mother's leaving home without her, later her phobic symptoms spread and involved the whole family. She herself refused to go to movies and prevented on occasion the rest of the family from going by brandishing a knife which made father very anxiously decide not to leave her home alone. Father felt afraid the girl might hurt someone or herself in her rage, which was what he himself feared he would do when *he* became destructive in his own rages. She was also unable to sleep at night without a light during this period. Father found his daughter one night turning on the gas in the kitchen.

The mother, who frankly discussed her sexual dissatisfaction with the father in her sessions, eventually talked of a guilty extramarital affair which was sexually very satisfying. This affair occurred 16 years before this period, just before she became pregnant with this daughter. The mother felt extremely anxious and guilty about what part she might have contributed to her daughter's illness. She was also very guilty about phantasises concerning sexual affairs with other men in which she indulged, even during coitus with her husband. She was afraid the therapist would tell of these phantasies to her husband. She deprecated her husband, calling him a rabbit, saying his short stature made it impossible for her to become sexually excited by him. His size, she said, made her feel as if she were in bed with her little brother. She had promised herself, when single, that she would never marry a small man, and yet here

[3] I am indebted to Robert Dalton, Ph.D., for the summary of his work with this family upon which this sketch is based.

she was tied to just such a man. She compared her husband unfavorably to the therapist who, she felt, was better looking and more considerate of her feelings. Incidentally, the daughter's phobias erupted in severe form during the week-end of a visit from the mother's brother who arrived to show them his new car, although the girl's sexual activity had been going on for the previous four months, and although she had generally been moderately anxious.

Father, a little man, lonely and rather isolated and self-deprecatory all his life, had lost both parents by death when he was five. He had felt exploited by an older half-brother and his wife while he worked hard on their ranch, getting up at five o'clock in the morning, until he ran away when he was eleven years of age. After several years of "knocking around," he got a job at a grocery store where he worked for 15 years. He then was similarly steady in his post-office job after this store closed. He spoke of himself as being always "very independent, maybe too much so." He was fearful of any close or tender feelings, recalling how a man he considered his friend once stole all his belongings in the middle of the night. He was easily hurt and angered as well as helplessly baffled by the daughter's symptoms and mother's neurotic involvement with her. When angry with his wife he frequently did not come home for meals from work, or slept in the afternoons at home and, according to mother, was generally uninterested in the four older children, who were all girls, and in doing things about the house. He seemed interested only in his youngest child, a boy.

The school phobia of the girl abated about six weeks after initiation of therapy shortly after her therapist discussed with her his understanding of her feelings, but pointed out the futility of continuing therapeutic work as long as she continued to be helpless about both her phobias and her sexual activity. During the week following this interview, after mother had gone to church despite the daughter's protest, the girl became more disturbed and confessed her affair to her mother. The mother, smiling and occasionally laughing while telling the therapist of the incident, said, "I didn't say anything for two or three minutes, just walked up and down the floor trying to decide what my reaction should be." Nevertheless, she told father when he came home. When their daughter told them she had confided her affair to a cousin, they both became very angry and slapped the girl, because she had not kept her sexual behavior a secret within the family.

Following this, the girl stopped having coitus although not all of her sexual play with the boy, and very gradually during the next five months most of the phobias were reduced as all three continued to work with the therapist till his departure from the staff. Both mother and daughter manifested strongly positive transference attitudes, competitive at times with each other, with mother frankly speaking of her sexual feelings for the male therapist. Father, although suspicious that mother, who looked better, gained weight, and lost many of her anxieties, was in love with some man, continued his work with the therapist with a generally positive attitude towards him and gradually gained more confidence in himself. There were repeated quarrels between the parents during this phase of therapy. These quarrels, however, tended to clarify the situation between them unlike those prior to therapy which ended in prolonged self-depreciation and sulky, hurt emotional isolation on the part of each of them from the other. Father told the mother several times in these later quarrels that she was free to seek a divorce; that she was as crazy as the daughter and that she babied her too much. He became at the same time more aware of the effect on himself and on the family of his previous prolonged periods of emotional estrangement from them and although he stayed away from the holiday meals because of mother's refusal to visit his relatives, he provided the money for the family's holiday. Mother, accusing herself of being crazy for staying with her husband, became angry not only with husband but with her daughter as well, and would leave home for several hours in the car. She became annoyed and irritated with her daughter's refusal to go for a ride with the family in order to go with her boy friend, but "took out" her irritability on her husband. She gradually became aware of this and eventually recognized that in spite of his faults and her sexual dissatisfaction with him, she needed to stay with him because of the children and that he was a good man who did the best he could as did she herself. Moth-

er then decided to go back to work the following year as she had done during the war and looked forward to this prospect both as a pleasure for herself to be with other people and to help with the financial problem of the family. Both parents decided to let the daughter decide whether she wished to go on in school or not, rather than—as mother had first thought of doing—demanding that she stay at home and care for the youngest children while mother worked.

Another clinical example is provided by the following biographical sketch, summarized from the statements of both parents, who had never been formally married, of an adolescent girl who came to our clinical attention at the age of 14 years. The father, 42, a professional man, was seen only once at the clinic when he gave information chiefly about the daughter and his life with her and the girl's mother. The few other facts about him were obtained from studies of the case by other clinicians prior to the referral to the clinic. He was said to be the only child of European-born parents. He had his pre-professional education in Europe, and he was said "not to believe in marriage." He was also described by the mother as artistic, Bohemian in tastes, irresponsible, but charming. At nineteen he was having affairs with many women while living openly with one by whom he had two children. He left this woman to live with our patient's mother, also in a common-law relation.

The mother, 38, and attractive, separated from her third husband at the time of referral to the clinic, was the only child of a sea-captain and a woman to whom she remained closely attached most of her life. She feared her daughter had inherited something from herself and her father "which should not be perpetuated" and she had determined never to have another child which brought such frightening responsibilities. She saw the same difficulties in the other children of the father by other women. Although very much in conflict about the daughter, the mother was not much interested in any help for herself and, expressing much hostility, came for interviews, she said, only because of the requirement of the Juvenile Court.

The parents had lived together until the daughter was about one and one half years old. Thereafter, "because of temperamental differences," they were separated more often than living together until the child was 6, when separation was final and father thereafter provided no financial support. The girl, at 5, frequently "snuggled up and burrowed into adults" in a way that father thought was more than childish affectionateness." After separating from the father, mother took the daughter to her own mother's home town for the next 2½ years, sending her to a boarding school during the week. When she was 8, male neighbors complained to the mother that the girl was too provocative with them in their homes and asked mother not to permit her these visits. When confronted with these complaints by the mother, the girl accused these neighbors of sexually approaching her. She also hugged and kissed several of her mother's boy friends so effusively that some of them did not return for further visits. At the same time, the girl gave the impression of being very jealous of the relation between her mother and grandmother.

When she was 8½, the mother lived and worked in the same city as the father, and sent the daughter to live with him and his third common-law wife and their three children. The third wife was said to be an alcoholic who on a spree was arrested for neglect of the children. Our patient was so unruly that the father returned her after one month to the mother who had further difficulty with her because of her continued sexual interests and talk of sex with various people in the neighborhood, and the landlady's son. Mother returned to the grandmother's city placing the daughter in two more boarding schools each of which, after a period, refused to readmit her because of her tantrums, sexual interests, her "dirty jokes" and bad influence upon other pupils. When she was 11 years of age, she again lived with her father for four months during which time she paraded in the nude before her 73-year-old grandfather whose young wife then left him. She was so sexually provocative with a married Japanese male house servant that he left, and she was having violent temper tantrums with her father who made futile efforts to keep her at home during the evenings. She accused her father of being sex-

ually promiscuous and she herself became obese and unclean.

The mother then married an orchestra leader and took the girl back but placed her in boarding schools again. Here, and also on weekends at home, her behavior became even more difficult. She sneaked out of windows at night to meet boys, or invited them into the house when her parents were away, using her allowance to buy them liquor, and boasted later of having had her first coitus at 12 with a man twelve years her senior. When taken to a therapist, who gave a poor prognosis, she told him that her mother and grandmother performed cunnilingus upon her. She was placed in the Home of the Good Shepherd for several months, again telling what were considered fantastic lies and being the center of troublesome groups. Mother removed her against advice after her third husband left the country, and again placed her in another boarding school where the girl told other girls of being pregnant and of needing an abortion.

When the school refused to readmit her for the next term, the mother in desperation returned her to her father, who was reluctant to have her again because of a recent coronary attack he had had, and because he was separated from his third common-law wife. The girl was out most evenings, talked of being pregnant, saying the father of the child could be any one of 30 or 40 men, and might be either black or white. Upon examination she was found not to be pregnant. Three or four months after coming to live with her father, she ran away from home, phoned him repeatedly for money, telling him she was in Mexico and other places intending to marry a gangster. After his repeated requests that she return home, she did so, saying that the gangster had given himself up. In a week or two she left home again. This time father reported her disappearance to the police who picked her up at an apartment where she boasted that she had "taken on six or more teen-age boys in a gang-bang on a dare."

While confined at the Juvenile Court detention home, she accused the father of having one of his women friends perform cunnilingus upon her, then of having a man friend have coitus with her, and finally of the father himself having intercourse with her. She spoke also of having been raped by an abortionist after she had had the benefit of his services. She looked forward eagerly to the front-page publicity she would have as a result of her father's trial.

Incidentally, the girl's mother testified in the father's defense and sympathized with him. The girl rather boastfully repeated the stories of incest, cunnilingus, etc., to the Court and to any clinician involved later in the study of her problems. She did not "know how she felt about George," as she called her father. She said that he was quick-tempered, generally irascible, and that her mother had had her only to hold her father, but she (the mother) should have known better since he had left another woman to live with her. She "knew" her mother hated her, and she herself needed love since she had never experienced it. The various examiners commented on her apparent lack of guilt or of any anxiety.

Upon the Juvenile Court's insistence, mother and daughter came for weekly interviews at the clinic and were seen by rather young and inexperienced therapists for about three months while the girl was kept in a closed home for girls. The father was not included in this work because he lived in a distant city and was planning a trip to Europe after he had been exonerated at his trial of this daughter's accusations.

Mother continued throughout this period to be deprecatory of herself, of the Juvenile Court authorities, and of the therapist. On the one hand, she was reluctant and anxious about again assuming parental responsibility for this girl which she felt would almost entirely preclude earning her own living or having a life of her own. On the other hand, she guiltily wished to find someone else, medical or Juvenile Court authorities, to relieve her of any further care for her daughter. This reflected her own deep doubts of her own worth, lovability and competence to take care of herself. At times she experienced a desperate need for a father surrogate for herself whom she feared she would again exploit and devour or be exploited or devoured by him.

The daughter, intelligent, somewhat obese, talked in her interviews of having no faith in anything but wishing she did, of her confused feelings, of a need for love, of her great-

er ease with older people than with persons nearer her own age. Her sophisticated manner. her expressed interest in art, dramatics and ambitions to know prominent people, covered a more insatiable infantile yearning for passive gratifications at which she thus indirectly hinted. Strong negative reactions in the therapeutic situation following her therapist's declining to convert the interviews into social discussions were frequent.

Both mother and daughter declined to continue with the successors of their first therapists as the girl's behavior had become calmer, and as the probation officer's anxiety and concern were relieved. Consequently the Court's requirement of "forced psychotherapy" was removed as the girl and mother agreed to live together again. A few months later it was learned that mother was relieved of her care by the daughter's marriage to a man in his twenties who was reportedly very fond of her. The mother was free to seek a fourth marriage partner.

A similarly life-long story of general impulsiveness culminating in repeated attacks upon women in the streets by an adolescent boy, the son of a rather egocentric couple who were divorced, with the boy thereafter shunted between them over many years, could be detailed. The father was an impulsive person, repeatedly changing his work, residence and women friends of whom he made no secret to the boy, and even advised, or tried to provide the boy with, sexual satisfaction at houses of prostitution as *his* attempts to cure his son of the penchant for knocking women down in the streets and being arrested for this by the police.

The mother, an extremely neurotic woman, with recurrent hysterical symptoms, sought and obtained the boy's release from the reformatory. She did this partly to get state financial assistance for his care when she felt unable to continue her sales-clerk work after a physician advised colpoplasty for an injury sustained during her son's birth. Her helplessness during a sudden hysterical attack of paralysis one evening led her, after lying on the floor all night, to ask her son in the morning to lift her back into bed. Although extremely guilty and anxious about it while telling her therapist about this later, she continued to have the boy carry her back and forth from bed to the bathroom for several days thereafter. Not too long after this incident the boy again was suspected by the police of several attacks upon women in the streets which were not confirmed.

Therapeutic work with all three was rather irregular and interrupted repeatedly, especially at first by father who was very reluctant to assume any financial obligation for the boy and later by failures of the boy to keep his appointments regularly. It ended after thirty months when the boy was caught by the husband of a provocative young woman whom he was coming to visit for the second time. He had followed her from a movie on the previous evening and had been admitted by her somewhat reluctantly to the house through a window while her husband was away from home. He was eventually committed to the state hospital for the criminally insane for institutional study of his sexual aberration.

A fourth clinical experience, illustrative of yet another variety of impulsive sexual behavior might exemplify—if space permitted a more detailed presentation—the factors in the past of the family history and in the current present events in the family life that one finds in any case of symptomatic behavior of a child which is well studied.

A mother, a former nurse, brought her 14½-year-old daughter to the clinic complaining that for over three years the daughter was extremely preoccupied with sex. She grabbed at mother's breasts and struck them whenever mother walked by her. When angry, which was frequent, she pulled at the penis of her brother and father and once kicked the latter in the groin. When this behavior first appeared, she had exposed her genitals to her brother of whom she had always been jealous, later saying she wished to impress him with her pubic hair. Although she and a girl friend had once done a strip act in front of a window at home, most of this behavior was confined to the home and towards the members of her family. She was usually rather shy, withdrawn, and had few friends at school or in the neighborhood. Mother also said she had been frightened of possible homosexual tendencies because her daughter had frequently rubbed

up against the mother's breasts "in a very sexy way."

Upon investigation, it was learned that mother herself had had repeated attacks of neurotic illness since her marriage, with which she was continually dissatisfied both sexually and because of her husband's poor income. She had sought and received pediatric care for the daughter from the age of four and almost continuous psychiatric service since the girl was six. In the girl's early childhood the mother was anxious about her daughter's masturbation, which began at 2½ years of age, and asked pediatricians for repeated vaginal and urinary examinations of the girl, which were always negative for infection or other disease. Later mother complained on various occasions of her daughter's negativism, temper tantrums, which mother felt helpless to deal with, of her day-dreaming, attacks of choreiform movements, sleeping poorly, doing poorly in school and of being teased and abused by other children. Every psychiatric clinic in the city and several pediatricians knew of her, as the mother went from one clinic to another whenever discontented, or to family service agencies; and five months before her application, the daughter had been in the psychopathic ward of the county hospital for 10 days, where for a time she was considered as possibly schizophrenic. Mother, too, was thought variously "a simple schizophrenic," as "paranoid" and as "untreatable" by various clinicians. On one occasion the father had become very disturbed, threw things, had severe headaches, and his wife feared he would kill the family. He was seen only once at a psychiatric clinic.

Each of these past episodes of the mother's increased complaints about her daughter during the previous eleven years was on closer scrutiny related to various events in the mother's, or in the family's, life disturbing to the mother. Some of these events were: The murder of her brother who was stabbed by the wife he had left; the father's loss of a job during the depression and the family's going on relief; the maternal grandmother's coming to live with the family and interfering with the parents' management of the children and with the mother's ability to experience orgasm in coitus while her mother was sleeping near their bedroom; the grandmother's subsequent sudden death from a skull fracture due to a fall down a flight of stairs while visiting her sister; the father's night work at one period; the mother's difficulty in learning welding during the war and her suspicion that her fellow pupils made unfavorable remarks about her; the father's reported periodically lessened sexual desire while mother's libido increased; and subsequently, repeated changes in staff of a psychiatric clinic she attended periodically and the staff's decreasing hopefulness about the outcome of their work with the mother.

Both mother and daughter were seen in regular interviews for over four years each by a series of therapists, each of whom remained working with each of them at least a year or two. During this period many of the original symptoms of the girl decreased markedly and she did better in school, eventually graduating from high school as the mother became progressively less anxious and began to work again as a nurse during the last year of their visits to the clinic. It is not possible to do more than mention that as mother's neurotic anxieties and inhibitions about her own sexual impulses, about her rage and about work were gradually reduced, and similar problems of the daughter were also somewhat relieved in therapy, the close neurotic nexus between them was also loosened. Each then began to be able to have more satisfying relations with others both within and outside of the family. These changes included both a lessening of mother's sadomasochistic libidinous drive, and a more consistent satisfaction in coitus.

If space permitted, one could give similar vignettes of clinical experience with adolescent and preadolescent boys who have murdered girls. In those boys of whom we have any detailed knowledge, there appeared to be present an almost complete inhibition or denial of sexual impulses and interests. Generally we could also discern some unconscious provocativeness, or at least opportunities for sexual stimulation, of the boys by the mothers. Some of these mothers manifested severe repression of their own sexual and hostile impulses and a marked immature anxious helplessness about injuries which either they themselves or their sons suffered. The sons recalled these latter episodes of injury and their mother's paralysis about taking care of them, with bitter, cold

hostility and contempt. The father was either absent by death or was unassertive in the home in relation to the mother and sometimes sexually unfaithful to her.

Although in a way unrelated to the present subject of sexual impulsiveness in children, I cannot resist mentioning that we have also seen sadomasochistic sexual impulsiveness, or at least symptoms related to the genitalia, in several schizophrenic children. In one boy, whose psychotic episode of about three years' duration began when he was 4½ years old, after the birth of his only sister, we saw among other symptoms during his hospitalization prolonged efforts at tearing off his penis and a desire to be a girl, which was most often expressed to his mother who was thereby extremely disturbed. Corresponding anxiety and loss of sexual desire for long periods and extreme feelings of general incompetence were apparent in both of his parents, who had married young and were not only extremely infantilized by their own parents late into their adolescence, but who were still much ambivalently dependent upon their own mothers during the greater part of our four years of therapeutic work with this family. For a long time these parents could not sleep together when the boy was home because mother felt it necessary to sleep with him in order to calm him by keeping her hand on his head, as he demanded, until he fell asleep.

Another boy, who was entirely mute, once cut his penis, and frequently held his genitals in his hand when approaching nurses. He was the issue of his mother's one extramarital affair in which she indulged because her husband's severe hypospadias and an unsuccessful surgical repair precluded satisfactory intromission and coitus. Another eleven-year-old, mute, schizophrenic boy, perhaps the most extremely and most persistently isolated child in our experience, was not only still sleeping with his divorced mother at home on weekends, but mother also took showers with him. We have also had the opportunity to learn during therapeutic work with mothers of other schizophrenic and neurotic children, especially girls, that the mothers were extremely guilty about their own sexual responsiveness during bodily contact with the child. In each of these instances the symptoms of the child included severe nocturnal terrors while sleeping with mother, or in the case of the psychotic children much open genital and anal masturbation, exposure of breasts, invitations addressed to nurses to perform cunnilingus upon them, and such acts as grabbing of the nurses' breasts, legs or lifting of their skirts. In some of the neurotic girls one of their chief symptoms was obesity. In an instance of an early adolescent girl's episode of severe anorexia alternating with marked obesity, the child told her therapist, towards the end of a 2½-year period of treatment, that her obese mother did not want her at home because her periodically alcoholic father tried to fondle his daughter's breasts.

Such clinical data as I have here barely outlined and merely suggested in these vignettes and impressionistic statements do not, of course, form a sufficient, detailed basis for any well-grounded theoretical formulations. They do, however, suggest the necessity of taking very much into account—in any effort to understand the genesis and maintenance of the child's disorder—the psychosexual actuality of both of his parents. It is important for me to know the experience with this actuality of any child who presents any clinical, preoedipal or oedipal problem—whether this problem is overtly an impulsive character disorder, neurosis or psychosis. In particular clinical instances such facts of the parental, interparental, and parent-child experiences concerning libidinous impulses may not always require any important modification of therapeutic methods with the child himself. This is perhaps particularly true of the transference psychoneurotic disorders of childhood where thorough, classical psychoanalysis of the child may be sufficiently efficacious.

My impression from over 15 years of experience in psychiatric clinics for children is, however, that in many of the severe impulsive and psychotic disorders of childhood a concomitant psychotherapeutic approach with the parent, particularly with both parents, may not only provide a more hopeful and sometimes a more effective therapy; it may also provide the detailed clinical data upon which our theories of personality development, and of etiology of the whole psychopathological spectrum may be made more precise and specific. Formulations based on such clinical data concerning the

earliest, pregenital vicissitudes of the child's libido, especially of its sadomasochistic transformations in the climate of parental regressions, may permit a clearer and mayhap simpler delineation of the factors, inherited and experienced, determining both the degree of ego-superego-id schisis or malformation and the degree of genitality, i.e., of intrapsychic integration achieved by any human being. In particular, the role and nature of the incorporations, introjections of, and identification with, both parents as actually experienced, and *their phantastically revengeful, caricaturing* intrapsychic distortions may be more obvious from the facts of a child's experience in his life situation. In sum, in our efforts to understand the most impulsive or the most bizarrely psychotic symptoms, we may then need less recourse to hypotheses, hitherto relatively unprovable in the individual case, of genetic constitutional factors. We might find the same factors found sufficient to explain the clinical phenomenology of the transference neuroses, also sufficient qualitatively, but only quantitatively different in their intensity, duration of their action during the child's various developmental periods, to explain the impulsive and psychotic disorders.

If the child's endowment transmitted to him through the genes is excluded from consideration for the moment, a tentative list of at least some of these more or less independently variable, experiential factors and their possible relations would read as follows:

1. The particular *intensity* and *form* of the *neurosis which one or both parents* bring in their personality organization from previous life experiences to the marriage or to the time of the child's birth.

2. The particular *events in their marital history* which constitute a stress or frustration to one or both of them and which specifically and quantitatively in combination intensify the preexisting, and more or less latent, parental neurosis. Among these I would include both those stresses determined wholly or in part by their neurotic tendencies as well as those which occur independently of such tendencies, but which significantly affect them. Examples of the latter are: Wars, general economic factors, somatic illnesses—their own or those of close relatives upon whom they are ambivalently dependent, and so forth. I think the birth, or the time of the birth, of the child himself or his sex, his intelligence, his health and attractiveness, may be included here.

3. The *developmental phase* or *phases* of the child during which he experiences these neurotic attitudes of his parents in response to those of his needs which are characteristic of his state of biological immaturity and helplessness. Because of the child's unsatisfactory experience during these phases, this factor determines the particular zonal fixations and the future libidinous regressions upon later stress, the specificity of which is also here determined. The earlier the developmental phase, the deeper is the later regression, other factors being equal.

4. The *duration* of operation of these factors which determine the *intensity* of the zonal libidinous fixations and the readiness of his later regressions. To put it in other terms: The longer the neurotogenic factors operate, the greater the fixation, and the slighter the later stress or frustration which precipitates the regression.

5. The *child's reaction* to these factors is, of course, not only one of libidinous fixation, but also consists of the incorporations and introjections of, and identifications with, both parents' conscious and unconscious attitudes towards their own libidinous, bodily tendencies which are reflected in their behavior—neurotic and integrated—towards each other and towards the child. These two factors, the libidinous fixations and the internalization of the parents' attitudes, detemine which impulses of the child become ego-syntonic and which are repressed. To the extent that these factors interfere with the child's satisfactory experience in any developmental phase, the internalized attitudes are revengefully (i.e., sadistically) caricatured and the libidinous impulses are masochistically distorted, i.e., the libidinous energy of both the id and the superego is fused with the rage and anxiety consequent to the repeated thwarting. It is here that Dr. Adelaide Johnson's phrase "super-ego-lacunae" belongs. If the parental attitudes are not solidly integrated in their own personality organization, i.e., if they are seriously ambivalent in their libidinous tendencies, or manifest reaction-formations in regard to them, the child's

identifications may combine the lack of firmness and a similar corruptibility of both parents in his own super-ego. The child's resulting disorder may then overtly appear more severe than that of either parent.

Necessarily the other results of all these processes are: 1) *ego malformation,* of a degree directly proportional to these malintegrative processes, and 2) learning disability which may be specific, or more generalized as in mute, very isolated schizophrenic children—or in the impulsive character disorders. As we know in both of these disorders, later experience even with persons other than the parents is integrated only slightly, if at all. The well-known poor prognosis in response to the usual form of analytic therapy, I think, is another expression of all this.

6. It is perhaps hardly necessary to add that this neurotic development of the child's personality has a further potentiating, neurotogenic effect upon the neurosis of the parents. It is the presence of these vicious circles thus established between the parents and between them and their child which, to me, often constitutes the indication for therapeutic work with all three.

Finally, it seems to me that the time in the family history of the occurrence of these factors, and their particular combination, determines not only which child develops thus—if only one of several in a family is primarily affected—but also what the form of his disorder will be.

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INTELLECT AFTER CEREBRO-VASCULAR ACCIDENT[1]

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The relationship between certain brain lesions and intellectual impairment presents a common clinical problem. Earlier investigators observed a disability in many of their aphasic patients, an impairment of abstract thinking. From the frequent coincidence of these intellectual disturbances with language disabilities an intimate association between language functions and abstract thinking was inferred. This inference has had a profound effect on considerations of the nature of language functions and language pathologies, and, of necessity, on theories of brain organization.

Head (8, 9) accepted Jackson's concept of aphasia as an inability to "propositionalize," and extended it to include disabilities in all performance tasks involving symbolic formulation. Aphasia came to be regarded as a thought disturbance causing a failure in disparate areas of symbolic thinking as well as in language From his exhaustive clinical examinations, he reported that his aphasic patients were generally capable of the simple discriminations involved in matching tasks but were disabled in acts requiring symbolic representation.

> "The more nearly the task approximates to a simple act of matching, the less does it suffer in those forms of defective speech on which this work is founded. All my patients could choose some familiar object, colour, or geometrical figure, which corresponded to the one shown to them. . . .
>
> "But any act of mental expression which demands symbolic formlation tends to be defective, and the higher its propositional value the greater difficulty will it present." (8, p. 165.)

Goldstein (4) came to a similar conclusion from experience largely with cases of expressive aphasia with frontal lobe trauma. He reported that aphasia is associated with impairment of the attitude toward the abstract, that this "personality" change is to be found especially in cases of lesion of the frontal lobes, but it may also be observed to some extent in cases of lesion of other parts of the cortex. He added that patients with lesions of the left hemisphere (if they are right-handed people) present this change to a greater degree than patients with right-sided lesions (4, p. 89).

Halstead (5, 6), in comparisons with nonfrontal cases, found that patients with frontal lobe excisions produced more object groups characterized as categorically unstable or mixed, and a lesser number of groups characterized by objective stability, i.e., representing pure categories. This observation could be regarded as in essential agreement with Goldstein's localization of abstract functions.

Thus, the study of aphasia led to a definition of associated intellectual impairments in cases of brain lesion. This, further, prompted the advancement of theories of brain organization with particular emphasis on the frontal lobes as the site of higher integrative functions involving language and abstraction.

However, this conception of brain functions has been recently contested by Teuber, Bender, and Battersby (13). These investigators, like most previous workers, used complex visual tasks, but did not get significant differences between frontal, middle, and posterior lesions in visual performance testing of veterans with head wounds. This writer also had observed highly abstract behavior among aphasic patients in various hospital life situations. While some indeed demonstrated a conspicuous disability in this regard, others manifested extraordinary powers of abstraction, performing exceptionally well on sorting and design tests, winning consistently in card games, checkers, or chess against good competition, choosing goals and systematically working toward them in therapy despite interference and injury.

Therefore, the evidence from studies of cortical localization of language and abstrac-

[1] This research was submitted by Robert W. Bauer in partial fulfillment of the requirements for the Ph.D., Department of Psychology, University of Chicago, December, 1953. Research was conducted at the Veterans Administration Hospital, Hines, Illinois, where Miss Dorothy M. Becka is Chief Electroencephalographic Technician. Conclusions herein are those of the authors and are not to be construed as necessarily reflecting the views or endorsement of the Veterans Administration.

tion disturbances left a number of questions to be resolved. Several of these propositions or questions, which were investigated directly in this study, are the following:

1. Do aphasic patients demonstrate more impairment of abstract ability on non-language tests than other (nonaphasic) brain-lesion patients?

2. If not, do left-hemisphere lesions or right-hemisphere lesions result in lower scores on non-language intelectual tasks?

3. Do patients with frontal lobe injury display greater impairment of abstract abilities than patients with non-frontal lesions?

4. Are abstraction performances utilizing different modalities, tactual, visual, and auditory, positively correlated in brain-lesion patients?

5. Do differences in lesion locus result in differential impairment of abstract abilities in the three modalities, tactual, visual, and auditory?

Research Plan

Thirty-five individuals having recent unilateral cerebro-vascular accidents were studied intensively. (Four of these 35 were later eliminated from most considerations when three were found to have signs of bilateral cerebral damage, and one other had a lesion which could not be localized by any means available.) Measures of abstract ability were made in three modalities touch, vision, and audition —through administration of non-language psychological tests. Three additional intellectual tests were administered for measures of tactual recall, visual-motor form reproduction, and pictorial-situational comprehension and judgment. Language disturbances were systematically evaluated and classified with the Halstead-Wepman Aphasia Test (7). Lateral preferences were noted. And an electroencephalographic record of brain functioning was obtained. The case history was reviewed and evaluated neurologically. Various factors, such as time between cerebro-vascular accident and testing, age at time of cerebro-vascular accident, education, and hemisphere of lesions were checked for possible effects on intra-group comparisons. Age at the time of cerebro-vascular accident was found to correlate negatively with certain intellectual performances, and this factor was controlled in subsequent comparisons. Results of this study are reported hereafter.

Results

The first proposition, the association of aphasic disturbances with abstraction loss, as formulated by Goldstein, was not confirmed in this study. The aphasic group did not differ significantly from the non-aphasic patients in either the tactual, visual, or auditory abstraction tasks. Nor did they show any significantly greater loss in the other intellectual tasks administered.

The second proposition, Goldstein's conclusion that left hemisphere cases are more damaged with respect to abstract functions and possibly other intellectual functions, was not confirmed by the findings of this research, but the converse was shown to be much more credible. Of the six tasks, all showed a trend to greater impairment in those patients with right hemisphere lesions. These differences, however, were not uniformly significant, two were insignificant, and three were significant at a borderline level, with probabilities of 0.053.

The population in tables 1 and 2 is split at the median score of the group with the median included above or below the midline depending on which tabulation provides the

TABLE 1
LEFT-RIGHT HEMISPHERE DIFFERENCES IN ABSTRACTION

	Tactual			*Visual*			*Auditory*	
	L	R		L	R		L	R
Md	7	9	Md	9	4	Md	10	5
	3	7		6	12		5	11
	p=0.391			p=0.053			p=0.053	

TABLE 2
LEFT-RIGHT HEMISPHERE DIFFERENCES IN OTHER INTELLECTUAL TESTS

	Tactual Recall			*Form Reproduction*			*Healy Picture II*	
	L	R		L	R		L	R
Md	8	5	Md	10	5	Md	11	5
	6	11		5	11		4	11
	p=0.145			p=0.053			p=0.023	

most nearly equal distribution of high and low scores. The test statistic used in these and similar subsequent tables is the median test as described by Moses (12) and Fisher's exact method (3) of computing probabilities.

Thus four out of six sets of scores on intellectual problems showed differences between left-hemisphere cases and right-hemisphere cases, and these differences consistently indicated greater loss in the right-hemisphere cases.

While there was no adequate control of premorbid intelligence available, it was possible to demonstrate that there was no significant difference between left and right-brain cases in educational level of achievements. Also there was no significant difference between the two groups in age at the time of cerebro-vascular accident. Nor was there a significant difference between left and right-brain cases in the severity of dysfunction as indicated either by the electroencephalogram or the neurological rating of physical disability.

The third proposition, that patients with frontal lesions show greater impairment than patients with non-frontal lesions, was neither confirmed nor contradicted by the results of this study. The pattern of frontal–non-frontal, anterior–posterior lesions was such that no decision could be made regarding greater or less abstraction impairment with frontal lesions.

The most significant findings with regard to abstraction processes bore on the importance of the modality in considerations of intellectual loss. Chi squares computed for pairs of modality abstraction scores showed no significant correlations among the three modalities. Thus the fourth proposition was negated, or, at least, not confirmed, by these results.

However, the fifth proposition, that lesion locus might result in differential impairment of abstract abilities in the three modalities, was confirmed by the findings. Though tactual and visual abstraction scores did not show any special peculiarity in lesion location, auditory abstraction scores behaved peculiarly in all comparisons made. Distributions of scores involving various lobes and various divisions of the test population rather consistently showed a different sorting of those patients scoring low in auditory abstraction.

Of 34 patients, 13 showed slow waves (less than eight cycles per second) in the temporal region. However, 15 patients showed normal electroencephalograms despite diagnosed cerebral pathology. The presence of a transient sensory aphasia indicated temporal lobe involvement in three of these 15 patients having normal electroencephalograms. By adding these three cases to the 13 showing electroencephalogram slow waves in the temporal lobe, a statistically manageable two-by-two table could be constructed. All possible comparisons of the 16 temporal cases with the 18 non-temporal cases showed no significant chi square with any of the abstraction, memory, or other intellectual items, no significant difference in education, age, or physical disability, and no other differences excepting those in auditory abstraction and electroencephalogram abnormality. The latter stems from the allotment of 13 of the 19 abnormal electroencephalogram cases to the temporal group. However, it had been previously established that electroencephalogram abnormality did not correlate significantly with auditory abstraction loss nor with loss of any other intellectual ability tested. The drop in auditory abstraction in temporal lobe cases is illustrated below.

This difference between temporal and non-temporal cases in auditory abstraction performance is not significant at the 0.05 level of confidence. However, it does suggest that temporal lesions have a particularly destructive effect on auditory patterning.

It was observed that the 16 temporal cases above included not only most of the extremely low scores (in the lower left cell of table 3), but also some of the very highest auditory abstraction scores obtained (in the uper left cell). This disparity within the temporal group was unexplained until another peculiarity of the auditory abstraction results became apparent.

TABLE 3

AUDITORY PATTERNING WITH TEMPORAL LOBE LESION

		Temporal	*Non-temporal*
Auditory Scores	Md	5	12
		11	6

p=0.077

Previously, and without reference to the electroencephalograms, 15 cases had been judged to have more or less extensive sub-cortical involvement. These patients showed such signs as initial loss of consciousness in thromboses, hemiplegia in addition to either hemianopsia or hemianesthesia, etc. These 15 patients did not differ with respect to severity of electroencephalogram abnormality, physical disability rating, age, or temporal–non-temporal distribution, from the "cortical" cases. Nor did they perform in a significantly different manner from the 14 "cortical" cases on the tactual and visual abstraction tasks or on any other intellectual tasks, excepting that their differential performance on the auditory pattern items was striking, as is illustrated in table 4.

This difference is significant at a high level of confidence, and provides evidence that subcortical lesions destroy particularly the ability to utilize auditory patterns. When this classification was applied to table 3, which suggested an association between temporal region lesions and auditory abstraction impairment, it helped to explain the disparity previously mentioned between the low scorers and the high scorers in the temporal group. The high scorers (the five cases above the median in table 3) were exclusively "cortical" cases. Of the eleven low scorers, eight (or 73%) wese classed as "subcortical." In the non-temporal group, three of the 12 high-scorers (or 25%) were "subcortical" cases, while four of the six low-scorers (or 67%) were "sub-cortical." This distribution indicates that lesions involving extensive damage to the sub-cortex in the region of the temporal lobes selectively reduce ability to utilize auditory patterns.

Discussion

The difference between left- and right-sided lesions in their effect on intellectual impairment has been previously noted by other writers. Anderson (1) demonstrated greater impairment in the performance tests of the Wechsler-Bellevue Scale in individuals with lesions of the "minor" hemisphere. Weisenburg and McBride (14) studied a control group of 22 patients with right-sided lesions and no aphasia in connection with their larger study of aphasia. They found the right-sided cases to be inferior to the normal control group in all performances tested. There were particularly significant drops in reading comprehension, arithmetic computation, sentence completion, and the Porteus mazes. These intellectual loses were contrasted with the deficiencies found in aphasic patients.

> "In short, the cases of right-sided cerebral lesion without aphasia seem to be most like the normal on a few of the language tests, and less like the normal on non-language and arithmetic tests. This situation is of great interest in view of that found in cases of unilateral cerebral lesions with aphasia, where the greatest differences from the normal appear in language performances and the patient usually approaches the normal much more closely in non-language work and in arithmetic." (14, p. 329.)

Humphrey and Zangwill (10) in their report on ten left-handed patients with unilateral lesions, five right and five left, similarly found the incidence of aphasic symtoms to be consistently higher and more severe in the left hemisphere group, while the right hemisphere cases showed more impairment of calculation.

In conclusion, it can be inferred that the lateralization of language functions and peripheral motor manipulations in the left hemisphere may be paralleled by a specialization of right-hemisphere tissue in certain intellectual functions, namely; visual and auditory patterning, visual-motor form reproduction, and pictorial-situational comprehension and judgment. Further, from the literature, it may be hypothesized that right hemisphere lesions will result in significantly greater impairment of such functions as ideational comprehension, arithmetic computation, and visual-motor planning.

The Goldstein hypotheses of greater abstraction impairment in individuals having 1) aphasia, and 2) left-hemisphere lesions, were not confirmed by the findings of this study. From the results of this study and from the conclusions of other investigators it seems more likely that defects in symbolic formulation,

TABLE 4

Auditory Patterning With Sub-Cortical Lesions

		Sub-Cortical	*Cortical*
Auditory Score	Md	3 / 12	10 / 4

p=0.007

excepting the particular impairment of language symbols in aphasia, are significantly more severe in those individuals having right-hemisphere lesions. And it is well known that aphasia is extremely rare as a result of right-hemisphere lesion. Aphasic patients, as Weisenburg and McBride (14) suggested, are more nearly normal in those symbolic functions which exclude language. Aphasic patients, therefore, can be expected to have no more impairment in abstract abilities, judgment, or memory, than other patients with brain-lesions, and can generally be expected to retain more of these general intellectual abilities than non-aphasic patients with right-hemisphere lesions.

Consistent with the conclusion here, that lesions in the temporal lobes, and particularly sub-cortical lesions in the temporal region, destroy ability to employ auditory patterns, are the findings in current animal studies. Diamond (2) has recently completed an ablation study of the auditory cortex in cats. Three kinds of lesions of the auditory cortex were found to correspond to three kinds of behavioral results with respect to discrimination of auditory patterns: Inability to relearn; loss of the habit but with ability to relearn; and retention of the discriminatory habit. It was demonstrated that large lesions in the auditory cortex have more severe effects on behavior than small lesions. Diamond recommended an alternative to the "mass action" interpretation, suggesting that the area studied could be divided into several sub-parts, the function of each of which could be maintained by the presence of a small critical amount of intact tissue. He tentatively concluded that the anatomically and physiologically distinct areas of the auditory cortex are functionally distinct as well; and that the function of each part is on an "all-or-none" basis.

Jerison (11) has recently extended these studies to primates, specifically, the rhesus monkey. After ablation of the auditory cortex, frequency discrimination was lost but could be relearned; pattern discrimination was permanently lost. Thus, the intactness of the thalamo-cortical auditory system was demonstrated to be essential for pattern discrimination in a primate species as well.

Summary

Thirty-five hospital patients selected for recent, single, unilateral cerebro-vascular accidents have been studied intensively, employing clinical neurological techniques as well as psychological testing for language and intellectual disturbances. Lesions were localized and evaluated for severity by the electroencephalogram in addition to neurological reviews of the case records and laboratory data.

1. Aphasic patients did not demonstrate greater impairment of abstract ability than other brain-lesion patients.

2. Right hemisphere lesions resulted in lower scores on the non-language intellectual tasks employed.

3. Results were inconclusive with respect to selective impairment of intellect with frontal lobe injury.

4. Abstraction performances utilizing different modalities, tactual, visual, and auditory, were found to be not positively correlated in these patients.

5. While tactual and visual patterning losses were not found to be systematically associated with any particular lesion locus, auditory pattern discrimination was found to be particularly impaired in patients having temporal lesions, and especially in patients having sub-cortical lesions in the temporal region.

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ON THE NATURE OF FEAR, WITH REFERENCE TO ITS OCCURRENCE IN EPILEPSY

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In the practice of medicine fear is probably the most frequently encountered symptom; yet, despite much descriptive writing and the expression of many views, its nature remains but poorly understood. Few opportunities, however, exist to study fear which results directly from recognizable localized cerebral activity; that is, fear which is a product of the local activity, and not fear concerning any somatic manifestations of this activity, or resulting from knowledge of the presence of the lesion.

This communication is based on a study of cases whose fear was apparently the direct result of focal cerebral activity. Epilepsy occasionally allows the observation of fear clinically: not fear of the fit itself with its dread implications, nor fear resulting from an aura, either because it signifies the imminence of a fit or is by its unpleasant and strange nature frightening; but the other and rare fear which seemingly comes by itself irrespective of prevailing mood or thought and in any situation. It wells up abruptly, unaccountably and apparently spontaneously, and is usually accompanied by a well-recognized aura. It may occur several times a day or only a few times in 12 months. Thus, it resembles an aura, and, it is suggested, as one; and the patients learn to recognize that with its onset the seizure has already started: that the fear is a part of the seizure. Its duration varies from several seconds to two minutes. As with other aurae, loss of consciousness commonly, but not invariably, ensues.

The significance of aurae in terms of cerebral function was first appreciated by Hughlings Jackson. His study of focal motor attacks led to his amply confirmed hypothesis that the march of events in seizures reflected the spread of a discharging state to adjacent areas. That an aura is the initial part of the epileptic seizure now forms, in neurological practice, the basis for clinical localization of the discharging focus in symptomatic epilepsy.

If fear of the type described is an aura, it should represent the product of epileptic activity in some neuronal mechanism. If the fit which the fear precedes is of a focal type, the neuronal mechanism elaborating the fear during the march of events should be in close anatomic or neuronal integration with the site of the initial discharge.

A study of fear in epilepsy was of interest to establish the validity of these suppositions, and to allow observations on the nature and significance of this fear and its possible relationship to other fears to be made.

The earliest account of fear in epilepsy was by Hughlings Jackson in 1880. He published its occurrence in a male, aged 51 years, whom he suspected of having a temporal lobe tumor. He carefully noted that he did not mean fear of the fit but "fear which comes by itself" or, to use his term, isolated fear. He expressed the opinion that it occurred during slight discharges of very complex nervous arrangements representing parts of the body, especially organic parts, concerned in the manifestations of fear.

Gowers noted that emotional aurae occurred in epilepsy and took the form of fear, vague alarm, or intense terror. In his description of psychical aurae, Penfield reported a case of a patient with a temporal lobe glioma who had, as an invariable aura, a feeling of fear. The same author, in his studies on cortical localization, reported briefly three further cases, but was unable to form a conclusion regarding the cortical localization of the complex phenomena fear represents. Gibbs tabulated the aurae in 300 cases with psychomotor seizure discharges; fear was noted as an aura in four. A case of epilepsy reported by Earle et al. had an initial feeling of fear and a perceptual illusion that things were far away. Magnus et al., in their report of 34 cases with masticatory seizures, found fear and thoughts related to fear, at times associated with an epigastric sensation, in eight of these. In some abdominal or thoracic sensation often associated with fear was

obtained on stimulation of the insula and base of the temporal lobe.

The Anatomy of the Emotions

The famous James-Lange Theory of the Emotions has been extensively criticized on the basis that in effect it means no more than that an emotion is actually the sensation of the visceral changes which accompany it. Since the expression of this theory, the knowledge concerning the anatomy of the emotions has been founded on the works of Cannon, Dana, Head, Bard, Masserman, Ranson, Penfield, Papez, Maclean, Cobb, Fulton, and others.

Bard in his experiments carefully demonstrated that the principal center for the motor expression of "sham rage" was in the posterior hypothalamus. He called it "sham rage" because the animal's motor behavior was expressive of rage, yet there was no evidence that the animal was feeling any emotion. Masserman, Rioch and Brenner, and Hess have confirmed, by stimulation experiments, the hypothalamic localization of the rage reactions. Fulton described a case of sham rage occurring in a man after Zenker's fluid had been accidentally applied to the hypothalamus during an operation. In the experiments of Bard, emotional expression occurred in the absence of the cerebral hemispheres and the dorsal thalamus. For subjective emotional experience, he concluded the cortex to be essential.

On the basis of comparative anatomy, the part of the cortex connected closely with the hypothalamus is that of the medial wall (paleo-cortex and archipallium) of the hemisphere, while the lateral wall (neopallium) is more closely integrated with the dorsal thalamus (Herrick).

It might be expected that the primitive medial wall of the hemisphere is closely integrated with the hypothalamus, not only anatomically but also functionally.

In 1937 Papez synthesized the available evidence and proposed that the hypothalamus, the anterior thalamic nuclei, the gyrus cinguli, the hippocampus, and their inter-connections, constitute a harmonious mechanism which may elaborate the functions of central emotion, as well as participate in emotional expression. Most of the experimental support for his view has accrued since and, according to both Cobb and Fulton, is strong.

Pribram and Maclean have, by their neuronographic methods, shown the close neuronal relationship which does exist between the medial aspect of the temporal lobe and the neopallium. The close integration between the archipallium and hypothalamus has long been established, while it still remains to be shown whether the neopallium and hypothalamus are directly connected. Le Gros Clark and Meyer, and Ingram have discussed this at length without arriving at a final conclusion.

Brodal concluded that the hippocampus, the largest part of the archipallium, was an integrating mechanism coordinating olfactory and other sensory impulses to make a cortical control mechanism for autonomic reflexes.

Head believed that sensations received emotional content when nervous impulses reached the thalamus. Spiegel failed to produce emotional reactions from circumscribed lesions in the thalamic region. Lashley, in his critical analysis of the role played by the thalamus in emotion, concluded that the affective changes resulting from thalamic lesions were restricted to a small group of somesthetic sensations and could not be interpreted as a general change in affectivity; that the only part of the thalamic theory of emotions which had factual support was the localization of the motor centers for emotional expression within the hypothalamus. While Head's view was a stimulus to a physical approach to the emotions, the weight of evidence, as expressed by Lashley, is against it.

Clinical Investigation

Fear of the type under discussion has been observed in 44 patients with epilepsy. In investigation concerning subjective experiences the investigator is to a point at the mercy of the patient. These paroxysmal, intense episodes of fear are, however, so alike from patient to patient, so removed from common experience, so closely related to the fits, and so readily differentiated by the patients from ordinary anxiety concerning the fits, that they can be considered with the same objectivity as cortical paresthesias or other well recognized sensory auras.

An illustrative case history will be presented.

Case. A male medical student, aged 23 years, complained of fits which began one and a half years previously. Preceding these fits he invariably had an aura consisting of a peculiar sensation in the epigastrium and an intense feeling of fear. As a student his ability was above average, and he appeared stable and of good personality. The fear he described as of abrupt onset, more intense and unpleasant than any fear he otherwise ever experienced; different from any normal fear, inasmuch as it arose for no apparent reason and irrespective of present mood or thought or situation; yet it had a quality of peculiar familiarity "as though I had previously experienced it, even though at the time I know that this is not so." He had no hesitation differentiating between this unaccountable fear and the anxiety he might feel concerning the imminence of the fit which he recognized the fear or other aurae heralded. Further, this strange fear might last only fifteen to twenty seconds, to be followed by a complex physical state in which voices or the radio sounded strangely different. At this stage, cold sweating and pallor of the face were present and he was anxious concerning the approaching loss of consciousness, "but the other fear is different." Loss of consciousness commonly followed, but on several occasions did not.

He gave no history of cerebral trauma or epilepsy in relatives. A complete examination revealed no abnormalities. X-ray of skull, serology, cerebral spinal fluid examination, air encephalogram and bilateral carotid arteriograms were all normal. The electroencephalogram, however, showed, (fig. 1), in the drowsy phase of a sleep recording, high voltage 3 per second waves and occasional spikes in the right anterior temporal area.

Accompanying aurae. As in case 1, in 42 of the 44 cases an aura other than fear occurred at times or always, either preceding, accompanying or following the fear. The frequency of occurrence of these aurae in shown in table 1.

The aurae which immediately preceded or immediately followed the fear are shown in table 2.

TABLE 1

NUMBER OF CASES SHOWING THE VARIOUS AURAE WHICH OCCURRED WITH THE AURA FEAR

Aurae	*No. of Cases*
Psychical (visual or auditory)	25
Epigastric	14
Sensory (auditory or vertiginous)	12
Autonomic (palpitation, sweating, etc.)	9
Olfactory or gustatory	8
Masticatory	7

TABLE 2

COLUMN 1 SHOWS THE AURA IMMEDIATELY FOLLOWING FEAR WHEN THE FEAR WAS INITIAL. COLUMN 2 SHOWS THE AURA IMMEDIATELY PRECEDING FEAR WHEN THE FEAR WAS NOT THE INITIAL PHENOMENON

Aura	*(1) Fear Initial*	*(2) Other Aura Initial*
Epigastric	1	10
Psychical	5	6
Vertiginous	1	3
Auditory	1	2
Automatism	3	—
Autonomic	3	—
Olfactory	3	—
Aphasic	—	1
Masticatory	—	1
Total	17	25

From these tables it appears that psychical and epigastric aurae occur most frequently and are most closely related in time to the fear. In the cases in which the aura was infrequently accompanied by another aura, and particularly when the fear often occurred without a subsequent fit, a psychiatric label was usual. For a lengthy period of time one case who subsequently died from a subarachnoid bleeding from an aneurysm, and another case with a temporal lobe glioma, had been so diagnosed.

Twelve- to 18-electrode electroencephalographic studies were obtained in 42 cases. The EEG studies were of a routine kind, with hyperventilation as the routine activation method. Sleep, as an activation technique, was employed only when the resting and hyper-ventilation recordings were normal. Using sleep, five cases with previously normal records showed abnormal EEG changes. Of the 42 EEG (88%) studies, 37 were definitely abnormal. In 29 (80%) of these abnormal cases, the changes were focal. In 8 cases (20%) the changes were generalized, though in one more marked on one side. In 5 cases (12%) the EEG was normal.

The situation of the EEG focus in the 29 cases with well marked focal changes is shown in table 3.

The EEG changes varied from case to case and no specific pattern was observed. Five to seven per second irregular slowing or even

TABLE 3

FOCAL LOCALIZATION OF EEG ABNORMALITY IN 29 CASES OF EPILEPSY WITH FEAR AS AN AURA

EEG Localization	*Cases*
Anterior temporal—low frontal	15
Temporal	8
Posterior temporal	2
Anterior temporal	2
Frontal	2
Total	29

slow delta waves and spiking potentials were seen. In 3 cases there was EEG evidence of bilateral focal change, though in each the abnormality was greater on one side. These bilateral foci were in the frontal area (one case) and temporal area (2 cases). Figure 3 shows the changes in one case.

Figures 1, 2 and 3 are examples of abnormal EEG patterns observed.

PATHOLOGY

The cerebral pathology was verified at operation or post-mortem in 6 cases. Table 4 shows the pathological diagnosis in all cases.

In only seven cases, however, could the lesion be sited accurately. Three gliomas were within the temporal lobe; one meningioma was in the posterior two-thirds of the anterior fossa and an olfactory aura accompanied the fear; one meningioma was situated over the parietal convexity and it too resulted in an olfactory aura. The aneurysm was at the junction of the anterior-cerebral and anterior communicating arteries. The EEG in the two meningiomas localized the discharging focus to the anterior temporal pole. In one case, with a history of head injury, a pneumoencephalogram revealed a well-marked localized dilatation of the left temporal horn.

COMMENT

Jackson recognized from his pathological and clinical studies that the site of discharge of olfactory and gustatory aurae was in the region of the uncus. Penfield, by stimulation of the uncus, has reproduced an olfactory aura in a patient who had been liable to uncinate seizures. Jackson, Penfield, Green, Bailey, and others have shown by clinical, pathological, and

TABLE 4

PATHOLOGICAL DIAGNOSIS, VERIFIED AND UNVERIFIED, IN A SERIES OF 44 CASES WITH AN AURA OF FEAR

Pathology		*Cases*
Trauma		13
Neoplasm		
Meningioma	2	
Glioma	3	5
Vascular		
Aneurysm	1	
Arteriosclerosis	3	
Thrombophlebitis	1	
Haemorrhage	1	6
Cerebral atrophy (air encephalogram)		
Generalized	1	
Unilateral	1	
Focal (temporal)	1	3
Unknown		17
Total		44

stimulation studies that aurae such as those which in the present series accompanied fear result from temporal lobe discharges. The olfactory and gustatory aurae are the only ones recognized as being exclusive to the medial aspect of the temporal lobe. The difficulty of access to the medial aspect of the temporal lobe has, in man, allowed little study of this area by direct stimulation and electrocorticographic methods.

From a clinical standpoint, in the 42 cases with an accompanying aura, a reasonable assumption is that, at or about the time the fear was experienced, one or other temporal lobe was affected by a discharging state, before spread was sufficiently great to result in loss of consciousness.

Electroencephalogram. Jasper, et al., in an analysis of 500 cases who had been operated on by Penfield, concluded that the psychomotor form of epilepsy was not a specific form of epilepsy but merely one form of focal cortical seizure, arising within the temporal lobe; though many seizures, arising within the temporal lobe, with the same form of EEG, could not be described as psychomotor. In their series, 75% of 95 cases showed clear focal evidence in one temporal region in the preoperative EEG. A decided improvement in 66% of those operated on confirmed the ac-

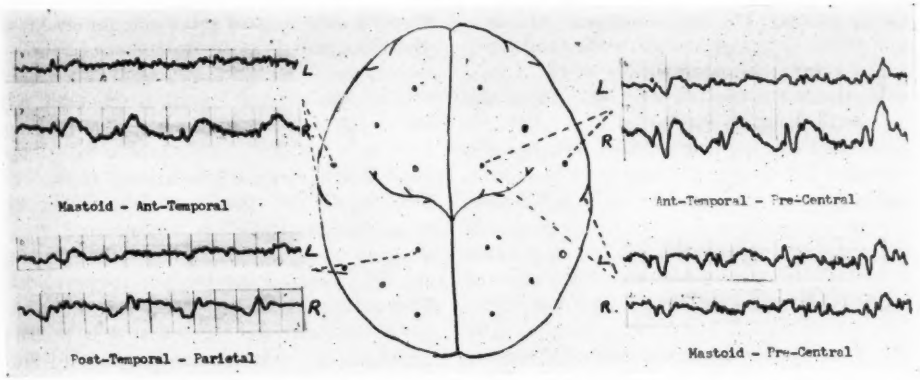

FIG. 1. EEG—Right anterior temporal delta waves with occasional spikes and with probable secondary involvement of adjacent areas. The focus appeared during the drowsy phase only.

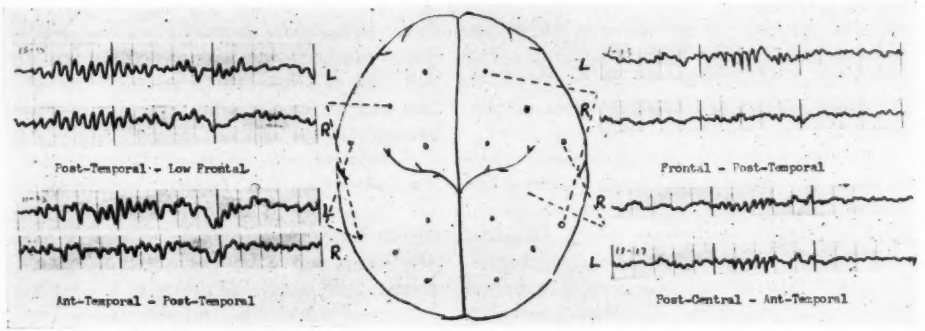

FIG. 2. EEG—well-marked 14 and 6 per second positive spikes, predominantly in the left posterior temporal area. No evidence of generalized dysrhythmia.

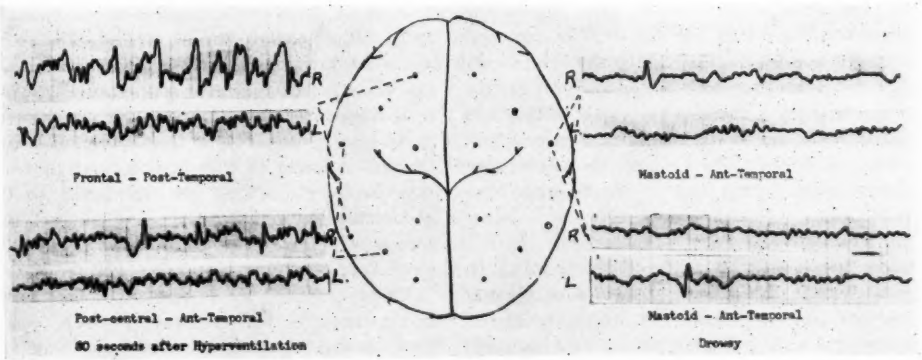

FIG. 3. EEG—Frequent isolated spikes in the left anterior temporal area, several independent spikes in the right anterior temporal area during drowsiness, and marked focal changes in the right frontal-posterior temporal area during and following hyperventilation.

curacy of the EEG localization and the situation of the cortical discharge. Bailey and Gibbs found anterior temporal foci in 24 of 25 cases with psychomotor epilepsy. The focus was unilateral in 18 and bilateral in 7; 10% of these cases had uncinate fits with déjà vu. The temporal lobe origin was confirmed by electrocorticograms, demonstration of pathological changes in portions removed at surgery, and improvement in the epilepsy following temporal lobe gyrectomy or lobectomy. The failure of anterior lobectomy in some cases, despite the presence of cortical spikes, was interpreted by Green et al. as indicating that psychomotor seizures may be fired from an area of neuronal injury within the subcortical connections of the anterior temporal lobe. Almost all the cases in the present series (table 1) are clinically either psychomotor epilepsy (temporal lobe epilepsy variant), as described by Gibbs and fully described clinically by Hughlings Jackson, who ascribed these attacks to activity in the uncinate gyrus and its connections, or temporal lobe seizures (Jasper).

The significant EEG finding is the localization—in the temporal or anterior temporal-low frontal area in 75% of those with abnormal EEG studies—a localization which coincides with that of so-called psychomotor epilepsy. The EEG thus strongly confirms a temporal lobe localization for the discharging lesion in these cases. If the conclusion arrived at by Jasper et al. that the regions primarily involved in psychomotor attacks may be within or subjacent to the temporal lobe, probably in the archipallium or in the sub-cortical structures related to the temporal lobe, is correct, the conclusion that the localization of the activity producing fear in epilepsy is in the temporal lobe is thereby supported. Thus in a high proportion of the cases the electroencephalogram confirms the clinical impression that the focus of discharge is in one or other temporal lobe.

Pathology. In both Penfield's and Earle's cases the lesion was in the temporal lobe. In four cases in the present series (three gliomas and one traumatic lesion) the situation of the lesion was also in the temporal lobe (Macrae). The subfrontal meningioma was physically immediately related to the uncal area, and the fear was accompanied by an olfactory aura. The aneurysm was situated at the anterior end of the gyrus cinguli—part of Papez's mechanism of the emotions—which, according to Papez, Cobb, Fulton, Maclean and Brodal, is connected with the hippocampus. The parietal meningioma alone was not immediately related to the temporal lobe or its close connections. In this case, however, the EEG showed an anterior temporal focus, and the fear was accompanied by an olfactory aura, suggesting that the discharging focus was in the anterior temporal area. This false localization—false for the tumor site but accurate for the focus—was probably the result of uncal herniation resulting from altered intracranial pressure.

The pathology of the present cases and those from the literature either supports or is consistent with the clinical and electroencephalographic findings, strongly suggesting that epilepsy with fear as an aura has a temporal lobe focus of discharge; and this focus is on the left side as frequently as on the right (Jackson had stated that when fear occurred as an aura the first spasm was on the left).

The Mechanism of Fear. While it can be concluded that fear without content may occur as an aura in epilepsy, and that this fear results from focal epileptic activity in one or other temporal lobe, the question raised, in terms of the nature of the fear, is what localized mechanism elaborates this emotion, or is the fear a function of the whole brain?

The evidence as adduced by Cannon, Bard, Papez, Maclean and others indicates that specific areas of the brain play the dominant role in the elaboration of fear states; though, as fear is a general state of feeling, it is probable that many parts of the brain contribute, via widespread neuronal connections, to the final subjective state—a state of consciousness in which 'isolated' fear is the strong emotional content. Speech, in a manner similar to fear, may in its elaboration be contributed to by wide-spread cerebral activity, yet subserving speech is a neuronal mechanism with a well-recognized anatomical situation (Symonds).

If, as proposed by Papez, a specific mechanism subserves the elaboration of the emotions, it can be accepted that focal epileptic activity affecting this mechanism will result in the experience of fear in the same way that similar activity affecting the uncus results in a

hallucination of smell. That focal activity results in a general state of feeling, does not infer that the whole activity is confined to that mechanism alone, but that the epileptic activity sets in train the specific cerebral events which is the experience of fear. If the epileptic activity is confined to this mechanism, fear alone (without content) will be perceived, in the same manner as epileptic activity in the post-central area is misperceived as a sensation in, say, the right hand. If the abnormal activity spreads, the area to which it spreads may be revealed by the character of the accompanying aurae. The experience of the fear or other aurae is the normal widespread integrative transmission of activity from the site of abnormal activity and its general appreciation, and not merely the local activity itself. Frequently accompanying the fear is a psychical state—a peculiar feeling of familiarity; feelings of re-living an alteration of relationship of person to environment—all of absorbing interest to the patient at the time. It is a strange objectivity in which consciousness, or at least remaining consciousness, is concerned with a subjective unaccountable state, yet contact with environment may be maintained, and behavior may be appropriate. When behavior is inappropriate, as in automatism, presumably during more complex and widespread activity (Jackson), the patient is behaving in accord with the mental situation. Whether this indicates a widespread or bilateral activity or merely intensity of activity in one situation, is a matter for speculation. If the former, it signifies a physical state blocking consciousness. If the latter, it may signify intense activity focusing attention—that is, inattention for other processes and sensory stimuli.

The explanation of this ability of some patients to experience abnormal psychical states and, at the same time, still recognize that which is abnormal from the normal is, according to Jackson, that the abnormal is the product of one temporal lobe while the other unaffected temporal lobe is still able to function normally. This state he referred to as "mental diplopia." The flight or desire for flight shown by some patients during the experience of epileptic fear, while appropriate with regard to the internal situation, is inappropriate with regard to the total situation. Appropriate behavior was usual and anxiety concerning the implications of the fear state was commonly retained, possibly a reflection of the bilateral situation of the cortical representation of the fear mechanism—a further example of Jackson's mental diplopia.

Relationship of Epileptic Fear to Other Fears. If fear is experienced as a result of epileptic activity only when a particular cerebral mechanism is affected, it is reasonable to accept that this is the mechanism which normally elaborates the emotion, fear, as the appropriate state for the situation.

Normal fear—the fear which is the response to situations of threat, real or fancied —must result from stimuli from internal or external sources of a most widespread kind. The medial aspect of the temporal lobe is ideally sited, as indicated by Papez, to receive afferent stimuli from widespread sources, and for motor expression via the hypothalamus; and it is phylogenetically old and architecturally simple as might be expected of the mechanism subserving a primitive response—fear.

One may speculate whether in some fears, particulary the slenderly based fears of the phobias, there is some abnormality of the fear mechanism whereby it either too readily acts on information received or else itself sets up activity, akin to epileptic activity, which on further elaboration becomes fear. There is some evidence, according to Fulton, that ablation of part of Papez's circuit (anterior cingulectomy) gives the best results in anxiety states and obsessional psychotics.

Summary and Conclusions

Fear, without content and unrelated to thought processes or somatic sensations, has been observed in 44 cases of epilepsy.

The paroxysmal nature of the fear and the relationship to the seizures have led to the conclusion that this fear is an aura. Other cases with fear as an aura have been cited from the literature. Clinical, electroencephalographic and pathological studies strongly suggest that this aura is a product of epileptic activity on either side and that the localization of the focal activity producing the fear is situated in the medial aspect of the temporal lobe suggesting that a localized mechanism, such as proposed by Papez, elaborates the cerebral

activity which becomes the emotional experience fear, and may in states other than epilepsy elaborate irrational fear. Pertinent literature concerning the emotions, their anatomy and their nature, has been discussed.

The aura, fear, when not commonly followed by a seizure, may not be recognized as epileptic activity, and yet as epileptic activity it is amenable to treatment and, moreover, it may be symptomatic of a more serious underlying pathology, neoplastic or vascular.

Observations on the nature of fear in epilepsy have been made.

The importance of consideration of the aura, fear, rests not only in that the aura may not be recognized as epileptic activity, but also in that this fear is the product of focal cerebral activity and so may add to the knowledge concerning the physical basis of the emotions. The emotions play such an important role in the realm of human behavior and endeavor, yet knowledge concerning their physical nature is still very limited.

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SOCIETY PROCEEDINGS

MASSACHUSETTS SOCIETY FOR RESEARCH IN PSYCHIATRY

Meeting of January 6, 1954

MILTON GREENBLATT, M.D. *President, Presiding*

All papers presented by members of the Department of Social Relations, Harvard University

SOME SOCIOLOGICAL ASPECTS OF AGGRESSION. *Andrew F. Henry, Ph.D.*

Distribution of the incidence of extreme acts of aggression in American society may be measured by the distribution of suicide and homicide. It is commonplace in psychoanalytic theory to view suicide as the expression of aggression against the self. If it is true that both suicide and homicide are acts of aggression—and that "aggression is always a consequence of frustration"—both suicide and homicide should occur as a consequence of frustration and should be undifferentiable with respect to their common source in frustration. Both suicides and homicide respond in systematic ways to frustration accompanying expansions and contractions in business cycles. Since the response of suicide to frustration arising from "relative" loss of status during business cycles cannot be differentiated from the response of homicide to frustration arising from the same source, we conclude that both suicide and homicide are acts of aggression similar to each other with respect to their common source in frustration.

Suicide and homicide differ in the "target" of the aggression and there are strong relationships between the *direction of expression* of aggression consequent to frustration and sociological categories. Status position is associated positively with suicide or "self-oriented" aggression and negatively with homicide or "other-oriented" aggression. Degree of involvement in meaningful inter-personal relationships with other persons is associated negatively with suicide and positively with homicide.

These relationships may be summarized in the tentative proposition that homicide varies positively and suicide negatively with the degree to which behavior is required to conform to the demands and expectations of others. The relation between the sociological and psychological or "super-ego" formulations of direction of expression of aggression is posed as a critical area for further research.

SOCIOLOGICAL ASPECTS OF IDENTIFICATION AND GUILT. *Edgar Lowell, Ph.D.*

Predictions, based on a theory of identification, concerning the relationship of guilt, adult role behavior, and the permissive-restrictive dimension of child rearing were confirmed in an upper-middle socio-economic class sample. In a lower-middle class sample the findings were not confirmed, and in some cases opposite relations were found.

The data consist of a two-hour interview with 379 mothers concerning their child-rearing practices and the current behavior of their five-year-old children, three sessions of projective play with the children, and teachers' ratings of the classroom behavior of the children. Socio-economic class membership was estimated from the education of the father and the family income. The interviews with the mother were recorded and transcribed. Trained raters made some 200 scale judgments concerning the mother's child-rearing practices and the current behavior of the child. The projective measures with the children consist of three sessions of doll play. In one of these, problems were introduced into the fantasy play by the experimenter, and the adult-type behavior of the child in solving these problems was recorded. In general, low super-ego or guilt ratings from the home and school reports were associated with low adult role fantasy measures and with a relatively permissive home environment in the upper-middle socio-economic group. No consistent pattern was found for the upper-lower socio-economic group.

The importance of socio-economic class variables in this type of research, in view of the

consistent differences in child rearing practices reported between these two groups, was discussed.

PSYCHOTHERAPY AS A SYSTEM OF SOCIAL ROLES
John P. Spiegel, M.D., Michael Reese Hospital, Chicago, Illinois; Visiting Lecturer, Harvard University.

The paper reports the attempt to apply a particular version of role theory to the processes that take place in psychotherapy. Role theory is selected because it seems to offer a good opportunity to integrate the insights into human behavior stemming from the social sciences with our understanding of the behavior of the individual based on psychodynamics. A social role may be defined as goal-directed behavior patterned according to cultural norms for the position an individual holds in a social group. Roles have structural and functional aspects. There are three structural aspects which bear analysis. The first is the goal structure: roles may be classified according to the aims they subserve, such as occupational roles, domestic roles, recreational roles, sex roles, and so forth. The second structural aspect is the value structure: here roles are classified according to what value either sanctions or forbids the particular role. In this way roles are related to moral, philosophical and cultural issues. Thirdly, roles may be analyzed according to their allocative structure: this refers to the way in which roles are distributed in the social system or, conversely, acquired by the individual. Roles are either ascribed, i.e., universally expected, such as age and sex behaviors, or achieved through a process of competition, such as occupational roles, or simply assumed, such as is the case with informal roles like that of the comedian, the wise guy, and so forth. The various structural aspects of two or more roles may be analyzed for the degree of good fit or strain that occurs between them. The functional aspects of roles arise out of the degree of goodness of fit or strain in their structural aspects. Complementarity in role function appears when the goodness of fit is at a high level and the roles are well geared into each other. High complementarity is equivalent to balance and equilibrium in the role. Failure of complementarity is equivalent to strain in the role system and is usually accompanied by signs of anxiety or defensiveness in the individuals concerned. Role induction and role reversal are two other functional aspects of roles designed to relieve the strain and restore complementarity when it has fallen to a low level. In role induction, one individual attempts to induce another individual to assume the desired role. There are many induction techniques such as flattery, supplication, or threats. Role reversal is an emergency attempt to restore complementarity by taking the role that is the opposite to that which one has been playing.

In any role system some of the roles are explicit, that is, close to the surface of consciousness of the individuals playing the roles. Other roles, on the contrary, are implicit, that is, to various degrees outside of the consciousness of the individuals in the role system. Psychotherapy is described as a process whereby reduction of complementarity is used as a tool to force implicit roles into the conscious awareness of the individuals in the role system.

Discussion

Jerome S. Bruner, Ph.D.: I'd like to talk about common lines in the three very excellent papers of this evening—all of them related to the cognitive aspect that John Spiegel discussed in his talk. Take the problem of role. The question of role is not only one of *playing* a role but also of *recognizing* a role being played by somebody else. Much of social behavior, particularly in our culture, is characterized by a great deal of masking of the cues by which our roles could be easily recognized by others. True, in a therapeutic situation, a doctor's role is clear. He has it, at the outset, on the front door name plate—Dr. So-and-So—and the patient is in no ambiguity about the matter. But many of our roles are ambiguous to those with whom we interact. And so there is always a problem involved in interaction. First of all, we must emit cues that are sufficiently unambiguous so that those in contact with us may know in what role we are acting (i.e., whether as friend or as doctor). Secondly, we must develop the subtle skills necessary for weighing the cues emitted by other people with whom we are in social interaction, so as to spot correctly what role they are playing.

I was struck, in connection with this last point, by a situation we ran into in a comparative study we did of various naval services. An old English seadog, who was a chief bo'sun's mate on British submarines, made the point that when a man comes on board and "has no personality" —by which he meant, plays no recognizable role—"we give him one." "After a bit, the men start to call him, 'Four Pint Fox,' the great drinker, or 'The Great Lover,' or something of the sort, to put him in some kind of a role so that they can react to him more easily in that

very enclosed situation that you get on a submarine."

Let me say this much in relation to the very provocative points that John Spiegel was making. I think that there is not only the problem of learning how to play roles effectively, with all that involves, but also the tremendous cultural problem of teaching people how to evaluate and recognize roles, between one stratum of society to another, from one kind of situation to another, and from one stress to another. Carrying this point now over to the other two papers, it seemed to me that in Dr. Lowell's paper, which was so suggestive that it made me feel like starting some experiments rather than discussing it, I had the feeling that what we need is some better techniques for finding out how the child perceives the parent—what the child sees the parent's potency to be, the parent's range of activity, and so on. He interviews parents on what the parent's child-training practices are. But how does the child perceive the parent's child-training practices? In what role does the child cast the parent? Now this is difficult to determine with five-year-olds, but I suspect that we could set up doll-playing situations in which it would be possible again to find out something about the child's perception of the parent.

Again, the same kind of point in Dr. Henry's paper. I worry about action at a distance, and effect of the business cycle on homicide and suicide is such action at a distance. One wonders how the external events of economic depression are translated into psychic reality. People do not respond to the business cycle as such, but to some particular, concrete event related to it, some event they see as threatening. Is the threat to some very close matrix of interpersonal relations, or somehow related to fears of isolation, or what? I missed the interviewing step: the translation of external events into individual experience.

Finally, one last point. I feel a real sense of delight in the growing recognition, represented by Dr. Spiegel's paper, of the importance of the social setting in individual adjustment. The importance of well-organized social roles and the minimization of role conflict and ambiguity are critical factors in mental health. The first half of this century has witnessed great strides in our understanding of internal dynamics, in the economy of the individual personality. I would hazard the guess that progress in the second half of this century will be represented by growing insight into the social setting: man's relation to man.

Leo Berman, M.D.: I have been asked to limit my discussion to Dr. Spiegel's paper. You may have gathered from the mode of presentation that the discussants have had no opportunity for prior study of the papers which were read tonight. We are fortunate in having a man of Dr. Spiegel's background and experience devote himself to a field of work which, to many of us, appears to be of considerable importance. I gather that it is Dr. Spiegel's intent to work toward a better integration of sociological and psychoanalytical concepts in a search for new insights and new facts. All of us wish him well in this search. I think that it is difficult, on the basis of a very brief and sketchy presentation, without careful study of some of the more difficult and unfamiliar concepts that Dr. Spiegel has offered us tonight, to say very much in an evaluative way. I'm sure that some parts of his paper sounded familiar to us, and we may have thought, "Well, he's saying something that I know about, somewhat, but I prefer the more usual terminology." Perhaps some of the other things he mentioned to us tonight sounded a bit new or strange, and I think in such instances it's well to wait and see how things look in writing and also to await further development and application of these concepts. I think none of us has any illusions about the difficulty of the task that Dr. Spiegel has undertaken. To refer briefly to one specific point: the concept of "social role." Dr. Spiegel has given us a rather concise definition of the way in which he is using it. It cannot be anticipated that all discussion about the term, even with this definition, will thereby be put aside. How does one play the role of father to a patient? Is it something that we are to conceive of along Moreno's psychodrama lines? Is it something like what Franz Alexander describes, when he informs us about how he planfully played a certain role with a patient? On what level does it take place? How are we to formulate it? I am sure I'm not raising any new points for Dr. Spiegel and it is unfortunate that there is simply not enough time to discuss it here tonight. In closing I should like to say that it is through the efforts of workers like Dr. Spiegel that we can hope in time to evolve better theories of human thought and behavior.

Gerald Caplan, M.D.: Dr. Spiegel's conceptual framework may help us investigate the details of the non-verbal interchange which we are beginning to recognize to be of decisive importance in many cases of psychotherapy. The patient allocates to the psychiatrist a role which satisfies his unmet needs. The psychiatrist identifies this

role from cues in the patient's behavior, as mentioned by Dr. Brunner, instead of conforming to it he maintains his own role. The therapeutic process takes place during the ensuing struggle to achieve complementarity. The whole process may remain implicit and apparently unconnected with the content of the verbal interchange between them.

Alfred H. Stanton, M.D.: I'm inclined to note something else that I think has run through the various papers for myself, and that is an interfering association, which is a very heavy brew, indeed. It permits me to get to some consideration of the place of theory, where we have a sociologist, and a psychiatrist, and a psychologist, at the same meeting, talking to psychiatrists. The days, I think, are not with us yet, anyhow, when we are going to be able to get very many critical experiments in the field of social psychology, in which one theory predicts certain things, another theory predicts the opposite, and we will now try to prove that one or the other is right. Because we are faced with a number of different conceptual frameworks, all of them admittedly incomplete, which interlace and overact against each other, and sometimes predict opposite conclusions, and sometimes do not. I have some specific questions which will perhaps give more detail to what I have to say. Dr. Henry spoke in terms of the frustration-aggression hypoethesis which I do not personally use but which I, at the moment, am going to try to, and under those circumstances attribute suicide to external frustration. Clinically, in a mental hospital, we have been much more used to speaking of internal frustration, that is, of inhibitions upon expression of aggression, turning against one's self because of guilt. Is it permissible, Dr. Henry, to draw conclusions from what you have said, that we are looking in the wrong place? I think the psychiatrist has to say that he will have to stand with his statement "aggression either goes out or in."

MASSACHUSETTS SOCIETY FOR RESEARCH IN PSYCHIATRY

Meeting of March 3, 1954

MILTON GREENBLATT, M.D., *President, Presiding*

REACTIONS TO THE WORCESTER TORNADO OF 1953. *Joseph Weinreb, M.D., Worcester Youth Guidance Center.*

The tornado struck at about 5:10 on the evening of the ninth of June, 1953, without any warning. The greatest damage done was in several housing projects and in areas of fairly closely-located low-cost homes, resulting physically in the death of about ninety people, the injury to varying degrees of several hundred and the dispossession from homes of nearly ten thousand people. All the established agencies such as fire, police and medical facilities went into action quickly with the assistance of the Civilian Defense Organization and volunteers. The immediate physical aid went very well. Despite a lot of confusion everyone was rescued and given relief promptly. Volunteers apparently managed to find useful work in the dominant concern of saving lifes.

The greatest chaos existed in the field of communications. Members of families who were in different parts of the city at the time were unable to communicate with each other for as long as 24 hours to learn of each other's safety. The American Red Cross was swamped by inquiries from all parts of the country as to the safety of relatives or friends within the city. Communication with the outside by telephone had to be limited to emergency calls only. A great deal of confusion still existed the following morning. A pall of sadness prevailed everywhere in the city that morning. The concern for the safety of co-workers, friends and relatives was great for several days.

Among the *clinic* staff there seemed to exist a sort of paralysis of action. The members of the staff expressed resentment at having to take care of their routine duties and wished to be quickly assigned to some duties helping the tornado victims. An emergency meeting of the heads of all the community agencies was held. At the meeting, there was confusion as to existing situation and as to where and in what way help was needed. The most annoying and irritating of those present was a non-professional representative of the local Red Cross who main-

tained cooly and steadfastly that the Red Cross could handle everything and needed no help. Others present knew that not to be factual, but felt helpless. It was agreed that action would be in an organized manner and that staff members from the various agencies would be called upon for help by a committee organized at this meeting. The clinic staff asked if they could not volunteer somewhere on their own time. They were given the privilege to volunteer anywhere where they could find themselves effective provided they did not neglect the clients to whom they had obligations. These events and feelings of the clinic staff are given because it was felt that this was a representative sample of the feelings of the community at large. Many people came to their own conclusions as to what was best for the cause and this lead to hasty action.

Psychiatric advice was very often sought by both some of the planning and some of the action groups. The newspapers and radio stations asked for advice to give to people reacting to the events. In addition, many ministers and individuals having some counselling relationship to people made many inquiries about what should be done. Pressure was brought to bear on the clinic to set up emergency psychiatric services for disturbed people. The clinic resisted setting up any other special direct psychiatric service. Our reasoning was that we could not muster the personnel to do an effective job. It was decided, therefore, that the clinic staff function in a consultative capacity to other people and agencies that are directly in contact with people needing help in order to help them to help understandingly, and refer for psychiatric help only those so severely disturbed as not to respond to their first-aid measures. The people we consulted with were the nurses of the District Nursing Society, social workers from other agencies, ministers, and group workers, as well as groups of parents.

While the total work of the community in relieving distress was excellent, there were many rivalries among organizations as to who should do what and who has what authority. In particular the definition of function between the Red Cross and the Civil Defense Agency at the outset did, in fact, interfere with very important work. It took several days to clear this up.

The *reactions of the individuals* followed a specific pattern. At first there was the concern for the safety of the immediate family members, and when they were located, there was a period of "numbness" without awareness of any anxiety. This was accompanied by a feeling of wanting to escape and never return to the area or even to the city. A few days later there ensued an interest in the welfare of their former friends and neighbors.

One of the great problems that *agencies* had to contend with was the frequent dependent reactions of those affected by the tornado. This reaction was noticed among those individuals who were ultimately referred for treatment to the clinic. The feeling of failure of those upon whom they depended to protect them seemed to have been common to all the cases referred for treatment. In all of the referrals the reaction of the mother was inseparable from those of the children. In each of the mothers there was the feeling that their dependency needs were not met by their husbands, and in all instances the children clung closely to the mother who was in turn incapable of meeting their dependency needs. The reaction after the tornado led to meeting these needs of the children to an even lesser extent and in some cases outright hostility occurred on the part of the mother as an expression of resentment of the children's dependency demands upon the troubled mother. The little children below three or four had the least reactions as long as they were with their mothers at the time of the tornado.

From our experience and study it appears that of primary importance is better organization of the community for meeting emergencies. Ways must be found to prepare beforehand a reserve organization beyond what exists at present for physical aid. Definite authorities need to be accepted beforehand, and a way must be found where the whole effort would be unified under an accepted strong leadership which would be respected by the community as a whole.

Discussion

Samuel Kaplan, M.D.: Dr. Weinreb's paper has stimulated me to think in more general terms about the reactions that children do show to traumatic life situations. We see a range of reactions: (1) A mobilization of defenses, resulting in assimilation of the traumatic experience, and a resultant emotional growth. (2) A partially successful mobilization of defenses with symptom formation. (3) At the other extreme, the overwhelming of the individual by the event, with resultant regression and symptom formation. This regression in turn may be temporary or permanent.

Some of the factors determining which of these eventualities occur are discussed, and a case is presented to illustrate the interaction of some of these determinants.

A STUDY OF SCHOOL PHOBIA IN CHILDREN. *Samuel Waldfogel, Ph.D., Pauline B. Hahn, MD., and George E. Gardner, M.D.; Judge Baker Guidance Clinic.*

It is the purpose of this investigation to learn more about: (1) the natural history of this disorder; (2) the dynamics of symptoms formation; and (3) more effective treatment and management of the disturbance through the active cooperation of Child Guidance Clinic and the School. On the basis of 20 cases thus far observed, it seems that the majority of these cases (15) conform to a definite pattern which may be regarded as constituting a unique pathological entity. In these cases the fear of school is essentially an anxiety reaction with a displacement of unconscious fears on to some aspect of the school situation. The reluctance to go to school is accompanied by a corresponding wish to be with the mother. Invariably somatic symptoms, usually involving the gastrointestinal tract, accompany the acute anxiety. The typical picture is that of the child nauseated and vomiting at breakfast, or complaining of abdominal pain, and resisting all attempts at reassurance, reasoning or coercion to get him to attend school. A smaller number (5) of cases seem to represent a more serious disturbance of the ego and are marked by paranoid, schizoid or depressive features.

This preliminary report deals with an analysis of the mother-child relationship of the 15 "classical" cases in which there seems to be a remarkable uniformity. The outstanding features of this relationship include :(1) an over-identification by the mother with the dependency needs of the child, which leads her to foster dependency in the child; (2) repression of her anger towards the child with resultant masochistic submission to the child's tyrannical demands. Beneath her ambivalent identification there seems to be a basic affectionate acceptance of the child with the capacity for genuine mothering. This permits a fairly high level of ego development in the child, and the neurotic symptoms seem to be primarily regressive manifestations under the impact of acute stress. The fear of school is a displacement of fears stemming from unconscious hostility toward the mother, and the need to be with the mother serves to bolster the faltering ego as well as to reassure the child that his hostile wishes have not been realized.

The main objective of the preliminary report is to discuss our attempts to define operationally the distinguishing features of the mother-child relationship and to establish objective methods for measuring them. This we hope will lead to a clearer delineation of this constellation so that it may be distinguished from the constellations found in other disturbances of childhood.

PSYCHOSOCIAL STRESS: CHILDREN'S REACTIONS TO HOSPITALIZATION AND THE USE OF THE RESPIRATOR. *Dane G. Prugh, M.D., and Stanley Cath, M.D.; Children's Medical Center*

The impact of brief hospitalization upon child and family involves certain objective stresses. The three major stresses are those arising from the threats of "abandonment," "mutilation," and "annihilation" which face the child, individually or in combination. The tendency of the young child, in particular, to misinterpret these actual threats in terms of fantasies related to fear of punishment for previously unacceptable impulses, makes quantification of the degree of stress for a particular child exceedingly difficult, especially since unconscious forces related to previous experience may be involved. Investigation in this area has indicated that children under four and previously disturbed children at any age tend to show the most intense reaction to brief hospitalization. The nature of the illness or treatment appears less important than its meaning to the child, in the context of his relationship to his parents and of immediately antecedent events, the meaning of his illness to his parents (in relation to guilt or anxiety), possible alterations in "family balance" following the discharge of the child, and other factors.

One specialized experience with illness is described, in which the tank respirator is employed for patients with respiratory paralysis resulting from poliomyelitis. Here the child continually faces possible death, is separated from his family for long periods, observes changes in his body structure, and is completely helpless and dependent upon the respirator and attending medical personnel. This unusual confluence of overwhelming stresses produces a more uniform pattern of attempts at adaptation and restitution, initially involving marked regression and denial of reality, followed by depression (or defense against it), and leading finally to a somewhat more reality-oriented approach to future disability, if the child's ego and the family's response permit. Children appear to be able to tolerate the enforced dependence more easily than can adults. Those who had been previously over-dependent or who had shown strong needs to deny passive wishes appear to experience the greatest difficulty in handling the dependent state, using defenses characteristic of their age group and individual personality structures. The

respirator appears to become incorporated as a part of the body image, and separation from it, which is involved in "weaning" during treatment, recapitulates old conflicts over separation from the parents. Specific modifications of psychotherapeutic techniques are necessary for these patients, with an ego-strengthening approach predominating.

As a result of statistical studies, it can be said that the stresses involved in hospitalization and illness do not necessarily cause severe emotional trauma for the child during the first year after discharge. Long-term follow-up studies are proceeding in regard to possible distortion of personality development which may result from later reactivation of previously compensated conflicts related to hospitalization. Controlled studies indicate that a preventive program of ward management, including frequent parental visiting and participation in ward care, is effective to a statistically significant degree, in reducing overt and immediate disturbances in children's behavior.

Discussion

Gaston E. Blom, M.D.: The studies by Dr. Prugh and Dr. Cath on the emotional aspects of hospitalization and in particular of the respirator care of patients with poliomyelitis are important contributions to a growing body of information concerning the emotional implications of operation, illness, and hospitalization on children. The emphasis in studies is on the special and specific emotional problems that are set up by disease and its treatment. Their discussion and suggestions are based on the direct psychological observations of children. These findings suggest ways by which hospital personnel and other workers can further help in the adjustment and rehabilitation of children and their families to illness and hospitalization.

BOSTON SOCIETY OF PSYCHIATRY AND NEUROLOGY

Meeting of March 18, 1954

DR. WALTER WEGNER, *President*

HYPERTENSIVE HEMORRHAGES OF THE PONS AND CEREBELLUM. *Harry C. H. Fang, M.D., and Joseph M. Foley, M.D.*

Subtentorial brain hemmorhages, pontine or or cerebellar, not infrequently present considerable difficulties in clinical diagnosis. Of 286 hypertensive hemorrhages at Boston City Hospital in 10,000 consecutive autopsies, 231 (80%) were cerebral, 29 (10.1%) were cerebellar, and 26 (9.1%) were pontine in location. Hence, nearly one out of every five cases in this series of primary brain hemorrhage involves either the pons or cerebellum.

At the end of the first ten hours after onset of symptoms, nearly 70% of the pontine cases were dead, whereas only 40% of the cerebral and 26% of the cerebellum group succumbed to the apoplectic assault.

Two case studies from both the pontine and cerebellar series (complete with anatomic confirmation) are presented to emphasize difficulties in clinical diagnosis of such cases. The "classical features" that make it possible to recognize either pontine or cerebellar apoplexy are seldom encountered in an extensive volume of clinical material.

Discussion

Dr. Raymond D. Adams: This subject of vascular diseases is always an interesting one to me because it represents the most frequent type of neurological disease we have to deal with.

Have you been able to reach a solution to any of the basic problems concerning hypertensive brain hemorrhage? There is a controversy as to what causes these hemorrhages—the hypertension itself or some damage to the vessel wall. The common teaching is that both can happen. The arteries of the human brain can stand pressure many times greater than from hypertension. Some kind of vascular disease must, therefore, exist. Dr. Zimmerman thought it was atherosclerosis. Has that been your finding?

Dr. Paul I. Yakovlev: Did you see any hyperthermia in those who survived more than a few hours?

Dr. Leo Alexander: It is intriguing to see these slides. Two cases come to mind. One from the Boston City Hospital, who had an episode about three years before her second fatal one. Autopsy revealed side by side an old cyst, and next to it a fresh pontine hemorrhage. This patient was a bank clerk who had collapsed,

vomited and developed a left hemiplegia with some eye muscle disturbances and nystagmus, three years before; she recovered and was diagnosed multiple sclerosis. She remained recovered for about three years when she had another similar episode. She died from the second much larger hemorrhage.

The other case is one I saw with Dr. James L. Poppen. There was sudden onset of left (upper and lower) facial palsy, nystagmus, vertical and to the left, and left hemiplegia with bilateral spastic signs. The diagnosis of thrombosis of the basilar artery was made, and confirmed by Dr. Poppen, proving the occlusion of the basilar artery by vertebral arteriograms. This woman recovered and is now symptom-free. This underlines the authors' thesis that some of these patients do survive.

Dr. John N. Walton: I was very much interested in this paper by Drs. Fang and Foley; the relatively high incidence of pontine and cerebellar hemorrhages was very striking. I had always had the impression that primary cerebellar hemorrhage was less common than intrapontine bleeding, although I have been struck by the frequency with which patients suffering from blood dyscrasias, such as aplastic anemia, have bleeding into the cerebellum.

Like Dr. Adams, I have often wondered about the etiology of primary brain hemorrhage. Bleeding always seems to occur deep within brain substance, from terminal branches of the arteries of supply. It seems that atherosclerosis cannot be the whole story since large arteries severely affected by atheroma so rarely rupture. The exact responsibility of hypertension is also very difficult to evaluate.

This paper also contains information of value to neurosurgeons. Now that a small proportion of cases of primary intracerebral hemorrhage are being attacked surgically, in order to remove blood clot, it will be important to remember that in a significant proportion of such patients bleeding may be primary within the cerebellum or pons and may sometimes produce a very similar clinical picture.

Dr. Fang: Dr. Adams asked whether or not we have any date about the pathogenetic background of such cases. Our present scope has been restricted to the analysis of the clinical data and emphasis on the survival period. We have always wondered about the nature of the pathogenetic process underlying such hemmorrhage states also.

As regards Dr. Yakovlev's question about hyperthermia in our pontine group, we have not presented our analysis of the clinical data here this evening. However, hyperthermia featured significantly in at least four of 19 cases. In one of them, the temperature reached 109° before death.

Critical Ages for Parental Death in Psychoneurosis. *Herbert Barry, M.D.*

There is a sex difference in the frequency of bereavement in psychoneurosis. If the ages of all persons when their parents die are charted, there are more parental deaths as individuals grow older. In psychoneuroses, three distinct types of curves appear: (a) Where the patient and parent are of opposite sexes there is a progressive increase in the number of parents who die as in normal individuals. (b) In female psychoneurotics, maternal deaths reach a peak during infancy. (c) In male psychoneurotics, deaths of fathers appear to reach a maximum during adolescence.

The second finding is most striking. The number of female psychoneurotics whose mothers died before they were three years old is four times the expected figure. This increase is highly reliable. It is confirmed by data on divorce; following parental separation more female psychoneurotics were prematurely deprived of their mothers' care.

Previously, emphasis on "broken homes" has obscured the importance of parental deaths and the significance of critical ages for bereavement. Nevertheless, several investigators have reported slightly higher parental death rates for neurotics than controls. Bereavement is more common in female delinquents than in males. These findings are consistent with results of the present study.

An Anti-Epinephrine Factor in Treatment-Resistant Schizophrenia and in Intractable Psychalgia. *Leo Alexander, M. D.*

Among the abnormalities of autonomic reactivity revealed by the adrenalin-mecholyl test (Funkenstein test) inadequate response to epinephrine—definied as blood pressure rise of less than 20 mm. Hg upon intravenous injection of 0.025 mg.—characterized the group with the lowest recovery potential and responsiveness to treatment. Prior to the present study, I had found that patients showing such reduced response to epinephrine did not respond to any treatment except insulin coma.

The present study is an attempt to investigate the physiological characteristics of reduced response to epinephrine. It was found that either atropinization or administration of Cortisone or ACTH counteracted the inadequacy of response

to epinephrine, suggesting that this inadequacy of response is probably caused and maintained by an anti-epinephrine factor of cholinergic, muscarinic nature which can be counteracted by atropine as well as by the production of a hyperadrenal state. Two patients in whom the response to epinephrine became normal on ACTH therapy showed marked clinical improvement. Two other patients improved clinically after maintenance of artopinization for several weeks. These preliminary experiences warrant more extensive therapeutic trial of ACTH as well as of atropinization in patients exhibiting this type of autonomic reaction pattern.

Discussion

Dr. Raymond D. Adams: I would like to know how many normal individuals have been tested in this way, and what are the individual variations in response to adrenalin. A failure to respond to a drug may have different meanings. Could it be an individual variation that we do not understand?

Dr. Daniel H. Funkenstein: Dr. Alexander makes two points in his paper: The first is that when there is a small rise in blood pressure after the injection of epinephrine, atropinization of the patient will result in an increased rise in blood pressure after epinephrine, thus bringing the height of the elevation into the "normal" range. This he interprets as indicating the presence of an anti-epinephrine factor. With this interpretation of the data, I disagree. The reason that intravenous epinephrine raises blood pressure is that it increases cardiac output. Thus in these cases epinephrine gave only a minimal increase in cardiac output. The most likely explanation of this phenomenon is that the cardiovascular reflex which prevents the rise in blood pressure from becoming too high is hyperactive. This reflex is most often mediated by the vagus. I would feel that Dr. Alexander has shown us that such cases probably have increased vagal tonus but has given us not evidence that an anti-epinephrine factor is present. Many investigators have searched for such a factor but it has not as yet been found.

The second point made by Dr. Alexander is that either ACTH or atropine in these patients changes the reaction to epinephrine and that they will then respond to treatment although previously they would not. I am very chary of any new treatment in psychiatry and must quote Arthur Ruggles to the effect that no new treatment in psychiatry should be accepted until ten years have passed due to the many uncontrollable factors at work in psychiatric patients. Certainly here the cases are too few to allow one to draw any conclusions about whether or not this method has therapeutic possibilities. This is not to discourage experimentation with new therapeutics but to urge caution with several years of work and careful controls before presenting them.

Dr. Alexander: I agree with Dr. Adams when he says that this inadequate response to epinephrine is an individual trait, the nature of which is obscure. However, it is a trait which is significantly correlated with greatly reduced capacity to recover from mental disease and to respond to treatment.

A statistical study of 200 consecutive mental patients in private practice which I completed recently revealed that markedly reduced response to epinephrine, such as is characteristic of Funkenstein's original group V, constitutes the most unfavorable prognostic group of all. The differences between all reaction groups among my 200 patients were found to be statistically significant at the 0.30 level. Inspection of the data made possible by a 2 x k Chi Square analysis revealed that group V was the greatest contributor to this difference as the most unfavorable group. In my largely acute clinical material, comprising this first series of 200 patients, group V was represented by 10 cases, that is by 5%. Six additional patients were encountered among an additional 50 patients seen in the past one-half year after the completion of the above survey. The physiologic studies reported in this paper were carried out in these 6 patients.

In a recent pilot study which I undertook on a chronic ward of the Boston State Hospital I found that, among 10 consecutive cases studied, 4 showed inadequate response to epinephrine. This finding, if confirmed by further studies, suggests that Funkenstein's group V contributes significantly to the residue of chronic "incurable" patients that accumulate on the back wards of State hospitals. I have never seen inadequate response to epinephrine in normals not under stress. The fact that inadequate response to epinephrine, found in patients prior to treatment, is associated with low recovery potential and poor response to treatment is also illustrated in the case of one patient who, during her first psychotic episode in 1950, had shown adequate response to epinephrine and responded to treatment. When she relapsed 3 years later, her response to epinephrine had become inadequate and this time she had also become unresponsive to all treatments except ACTH.

The only exception to the implication of poor prognosis is the rare temporary occurrence of

inadequate response to epinephrine during the inert inhibited state following an intensive course of electroshock therapy, the response becoming adequate again when the patient proceeds to full recovery.

Most patients show an enhanced response to intravenous injection of epinephrine after electroshock therapy. The cause of this exceptional reduction of response to epinephrine after an intensive electroshock series is obscure.

In speaking of an anti-epinephrine factor as responsible for this phenomenon of reduced response to epinephrine, I meant to apply this word in its widest possible sense. It could, of course, be a reduced tissue reactivity as Dr. Adams surmises, or enhanced vagal tone, such as Dr. Funkenstein suggests. I am fully aware that I have no evidence whether the antiepinephrine factor is chemical or neural or—more likely—both, since vagus action certainly is inseparable from the vagus substance.

I am fully satisfied with the validity of my finding that patients showing inadequate response to epinephrine prior to treatment will show normal response to epinephrine if atropinized for a week or while treated with ACTH or Cortisone. I fully agree that the marked clinical improvement shown by 4 patients, temporary in one, is certainly insufficient to draw conclusions as to the usefulness of either atropinization or of ACTH or Cortisone therapy in patients belonging to Funkenstein's group V. However, I felt that the clinical observations made were sufficiently provocative to warrant communication, mainly for the purpose of discussion and perhaps stimulation of others to investigate the phenomenon which I described. I might say in this connection that, as long ago as 1932, Leonhardt reported on the favorable therapeutic effect of atropinization in certain psychotic states. His treatment, although introduced 22 years ago, has never been adequately tested and therefore had no chance to stand the trial of time because it soon became overshadowed by more generally applicable physical forms of treatment, such as insulin and electroshock introduced soon thereafter. However, since the treatment of mental disease must strive toward everincreasing specificity of indications, it certainly would be of interest to see whether Funkenstein's group V perhaps constitutes the group to which this treatment may become applicable.

MASSACHUSETTS SOCIETY FOR RESEARCH IN PSYCHIATRY

Meeting of April 14, 1954

MILTON GREENBLATT, M.D., *President, Presiding*

1. A NEW METHOD FOR THE EXPERIMENTAL ANALYSIS OF THE BEHAVIOR OF PSYCHOTIC PATIENTS. *Burrhus F. Skinner, Ph.D.* (Dr. Harry C. Solomon and Ogden R. Lindsley have collaborated with the author in these experiments)

A patient is left alone one hour each day in a small room containing a device similar to a vending machine. The patient may operate the plunger on the machine and this behavior may be rewarded or "reinforced" with candy, cigarettes, or short exposures of interesting pictures. The rate at which the machine is operated is studied. Extensive research on lower organisms during the past twenty-five years has shown a comparable rate to vary sensitively with such factors as the schedule of reinforcement, the level of deprivation, emotional conditions, the effects of various drugs, the presence or absence of stimuli correlated with reinforcement, and so on. In psychotic patients we have so far concentrated upon the effect of schedules of reinforcement. On a "variable interval" schedule the operation of the machine is reinforced *on the average* once every minute, but at unpredictable intervals about this mean value. This has produced sustained responding for one hour each day for many weeks in the fifteen patients so far studied (diagnosed as catatonics, mental defectives with delusions, paranoids, and, in one case, a manic). The rates range from almost zero in the case of catatonics when first exposed to the machine to 10,000 responses per hour in the case of a manic subject. Long-hospitalized catatonics who have not responded to occupational therapy have shown an increase in rate of responding in this situation, and two such patients have shown marked cycles with peaks as far apart as forty days. The pattern of responding closely resembles that obtained with lower organisms. Another schedule called "fixed ratio" is similar to the piece-rate basis of pay in industry. The patients show another pattern of performance here, also character-

istic of lower organisms. The transition from one schedule to another is orderly. A patient may show one pattern on one schedule in one room and, in the hour immediately following, the pattern appropriate to a different schedule in another room while responding for a different kind of reinforcement. More than one thousand experimental hours have been recorded to date, but the sample is still too small for any general conclusions. It has been shown, however, that the general method can be used with psychotic subjects. The records already obtained provide an excellent base line for observing the moment-to-moment effects of drugs or the effects of other forms of therapy. The methods can be adapted to social situations in which cooperative or competitive behavior can be established.

Discusion

Richard L. Solomon, Ph.D.: I have no criticisms to make of the experimental technique or data analysis described by Professor Skinner. The fact is, Professor Skinner has shown that systematic behavior changes do occur in psychotics as a result of repeated, small rewards. Despite the fact that many of us would consider these rewards to be inconsequential, they definitely shift the ratio of non-psychotic to psychotic behavior during a one-hour period.

This research and its preliminary findings suggest several possibilities: (1) If the time of the sessions were lengthened, would the ratio of non-psychotic behavior to psychotic behavior hold up with the consequence that greater and greater parts of each day would be spent in organized activity? (2) Would there be extensive transfer effects to other tasks and other situations? If so, then a real therapeutic outcome could be anticipated. The subject should become more and more willing to manipulate his environment in a systematic manner.

It is an uncomfortable job to be required to comment on a magnificent pilot study that initiates a long and promising research program. Who knows where this research may lead? The striking aspect of it is that principles derived from carefully controlled animal laboratory experiments were used here. A scientific analysis of psychotic behavior, using the tools of research developed in the laboratory, cannot fail to help us in furthering the prediction, control, and understanding of human behavior. Professor Skinner is especially devoted to this belief, and it seems to me that his faith is warranted.

James Mann, M.D.: This is an extremely ingenious and fascinating experience. As I understand it, the basic goal is to get the psychotic patient to be able to react without undue stress to the physical environment and then, perhaps, to the human environment. The method is a system of rewards manipulated through a variety of schedules. Further, the aim of the experimenter is to gain "control" of the patient and force the patient to perform in ways deemed more acceptable. This performance is presumably achieved, with or without the willingness of the patient, by directing stimuli and a system of rewards to those parts of the central nervous system similarly affected in lower animals, and similarly available to external control. The experiments mean, then, that it is possible, with regressed patients, to make them respond like pigeons insofar as they can be "controlled" and made to produce predictable responses.

The experimenters use the terms "organism" and "control" quite as though they were still dealing with lower animals—or at least with an isolated nervous system. Personal elements are reduced as close to zero as possible. Presumably, the machine in the patient responds to the machine in the environment. Since we do not know what the patients *think* or *feel* in the process, the graphs, curves and other methods of quantification have little meaning in terms of *human* response as compared to lower animals. The way people manipulate their environment has incomplete meaning unless one also considers what it is in people that influences their method of manipulation. The recordings indicate function in a machine environment; they do not record process.

I venture the prediction that the transfer of these machines, impersonal reactions to the sphere of human relations will fail if only because clinical experience indicates that there is no substitute for reducing the psychotics' disabling fear of people except through experiences with other people in the specialized therapeutic milieu of a hospital or clinic where, in addition, special efforts are made to understand the emotional processes that make for psychosis.

The experiments point to two possible pathways in the search for means of inducing complete control of patients. One is the extirpation of the brain, bit by bit, until the patient can no longer react to the complex and provocative stimuli of human living but still remains alive. This trend must be watched for in current psychosurgical thinking. The second is to continue the "operant conditioning" process in an environment in which *all* people in the environment are under the same type of externally imposed ma-

hine control. One aspect of success in this regard has come to our attention in the brain washing methods of totalitarian states.

These comments are from the point of view of a clinical psychiatrist who admits to a certain prejudice that the concept that all machines are for man's own good is seriously open to question.

Dr. Skinner demonstrates that scientifically applied methods of external control can produce certain phenomena in pigeons and in men that *look* alike—I question whether he is entitled to say that they *are* alike. Between the stimulus and the response lie the differences somatically and emotionally, between men and pigeons. The reduction of human behavior to pure science is not without its hazards.

Peter A. Peffer, M.D.: I should like to say that I was very much intrigued on receiving the outline of Doctor Skinner's work, and very honored to have the opportunity to comment on it.

Some of this work ties in with some of the experiences I have had in connection with monetary incentives. Basic to all psychiatric treatment is the search for stimuli and reinforcing agents that will motivate the patient toward recovery. For that reason we now have extensive programs in modern psychiatric hospitals involving such features as medical rehabilitation, special service programs and other parts of the therapeutic community in which everybody working in the hospital is in a sense a therapist who can contribute to patient recovery. The hypothesis of Dr. Skinner's study is that direct reinforcement has great motivational value and will lead to behavior change in the direction of recovery. This is an attempt to study various aspects in the change of patient behavior, accomplished without establishing rapport and without the patient's comprehension of this situation. The researchers indicate that they have increased the overall rate of response to stimuli without establishing rapport. Nevertheless, there may be some bias in the experiment by virtue of the fact that the patients receive a great deal of individual attention merely by being subjects in the experiment, and undoubtedly the patients are sensitive to this fact. There is no guarantee that because a patient responds in a testing situation he will likewise respond in various social situations in which he will find himself during the course of each day. It would also seem that interpersonal relations are an integral part not only of the test situation itself but also of the disease. Thus it should be kept in mind that the producers of stimuli—namely, the individuals who provide the reinforcing agents—are basic to therapy no matter in what form it is practiced. There is also another basic motivating or reinforcing agent in our culture; namely, monetary incentive. Therapy is valuable only to the extent that it is geared toward returning the patient to the community as a socially and economically useful citizen. The monetary incentive is most important in our competitive culture. Therefore, its use as a reinforcing agent is important. Along with the monetary incentive should be the incentive of normal social living as is provided, for example, in the Member-Employee Program. Without denying the value of the reinforcing agents in this study, it would seem that we need to explore the use of those forms of reinforcement which more closely approximate the normal social patterns.

Ogden R. Lindsley: With Dr. Skinner's permission, I shall confine my remarks to answering two specific points raised by Dr. Mann.

(1) Dr. Mann used the expression 'with or without their permission' when referring to our control of the behavior of psychotic patients. I would like to make it clear that all of our patients worked for us only *with* their permission. The patients gave their permission, if not verbally, by coming with us to the experimental rooms each day, gladly, and without coercion. They were free to leave the rooms at any time during the experimental sessions. It is true that we were controlling their behavior in a fashion not completely known to them, but this is true of most forms of behavior control now used by society.

This brings up the question of control, with its Machiavelian implications. Control is not necessarily evil. We should make a distinction between two kinds of control; pleasant control versus unpleasant control, or control by the presentation of rewards versus control by coercion and punishment. Dr. Skinner and I control behavior only by the scheduling of rewards—by giving the patient something he wants in return for the behavior that we investigate. Certainly this kind of control cannot be damned. It is simply a scientific application of the 'Golden Rule' so often described by the various theologies. The control by coercion that is so often damned—we also damn. It produces by-products of emotion and aggression that interfere with the learning process. The controller must always be present to exert this aversive control for, truly, when the experimenter is away, the mouse will play. The fact that our patients now run to the experimental rooms is apt testimony that they are controlled by rewards and that they enjoy being controlled by these rewards.

(2) My second point concerns Dr. Mann's conviction that the increased ability to work in

our rooms will not transfer back to the ward environment or to social behavior. One of the most useful techniques that experimental psychologists have developed for the training of animals is the method termed "successive approximation." It simply means that in the training of animals you start with the simple and work up to the complex. If in our educational system we started with integral calculus, few mathematicians would exist. We start with elementary counting and successively progress through addition, subtraction, multiplication and division up to the calculus. In exactly the same way it might be possible to successively-approximate social behavior with withdrawn patients.

More specifically, we would first train the patient to work alone without psychotic manifestations. Then we would uncover a window through which could be seen another patient working a similar machine. After the initial disturbance had subsided we would introduce simple cooperation. If patient A pulled his lever it would light a light in patient B's room. This light would mean that the next time B pulled his lever a reward would be delivered. In this way the patients would learn to cooperate in setting-up each other's reinforcements. Later on we might be able to open a door between the rooms and elementary verbalization might occur. One patient might ask the other to set-up his reinforcement—asking for help, so to speak. After many hours of such training this cooperative team might be prepared to face the perils of a group therapy session together when neither would be successful alone. Each would have a tested helper, a friend, a colleague along for reassurance. I mention this only to suggest the generality of our method and that the transfer from the inanimate to the social environment can be made in small, easy steps which the psychotic might negotiate if given time.

We feel that this method of successivelly-approximating a social situation with withdrawn patients is worth attempting. We are not predicting its success or failure. We only know how to test its success or failure. We have an experimental method with a high degree of reproducibility and a wide range of generality and we feel that this small pencil of light should be turned on the dark depths of psychosis in still another attempt at illumination.

2. THE THERAPEUTIC USE OF ULTRASONIC IRRADIATION ON PREFRONTAL CEREBRAL TISSUE. *Peter A. Lindstrom, M.D.*

A technique was developed for the production of graded, controlled tissue damage to animal and human brains by ultrasonic irradiation through small trephines without opening the dura. Such therapeutic damage has been used as a substitute for lobotomy. Twenty-nine patients have been treated, mostly patients with intractable pain due to malignancy and the symptomatic improvement compares favorably with that seen after surgical lobotomies in similar patients. Even when the sound levels were restricted so as to cause only minor histological changes of the white matter in the path of the soundbeam a satisfactory lobotomy effect was obtained in many cases. No incontinence, stupor, convulsions or other complications have occurred postoperatively. Unintentional mutilation and parasurgical hemorrhages can be avoided with this method.

After minimal structural alterations of the prefrontal white matter produced by ultrasound there were in many patients relief of organic pain, of narcotic addiction and of anxiety and depression. Often it was hard to determine which factor was the dominant one in the suffering of the patients with incurable carcinomas. It seemed that the results were more gratifying when there was a large component of anxiety in the symptom complex of intractable pain.

Because the clinical material has purposely been restricted mainly to patients with incurable malignancies a high percentage of autopsies has been obtained—seventeen brain specimens in all—and on the basis of the neuroanatomical findings in animal experiments and in this large autopsy material it has been possible to standardize the cerebral ultrasonic irradiation fairly well. The therapeutic damage can be limited to minor or reversible histological lesions within the centrum ovale of the prefrontal lobes with comparatively little or no histological changes of the cortex or the cortical vessels. It is possible to grade the amount of damage in proportion to exposure time and sound intensity, to repeat the treatment when indicated, and to predict with reasonable accuracy if the tissue alterations will be temporary or permanent. The procedure is now at a stage of development where the indications can be extended to patients with certain mental disorders but who also have a long life expectancy.

Discussion

Harry C. Solomon, M.D.: Several years ago we got interested in the possible application of ultrasonics in the lobotomy problem. Dr. Rinkel went over to M.I.T. where they were doing work with ultrasound, and discussed the applicability and

possibility of developing the method. We didn't have perhaps the fortitude and finances, so we failed to carry it through and left it at the discussion level. Now, the thing that seems to me to be of primary significance in this procedure is the possibility of advance in our methodology. What we are looking for in the lobotomy process is the most scant site of destruction which will cause the optimal effect. That we get great benefit from lobotomy in many instances is unquestionable, I think, but we are always looking for the possibility of defect. How can we produce the destruction in minimal fashion and yet get good results? Such a method as that which Dr. Lindstrom talked about has the possibility of multiple exposures without a great deal of extra surgery. That is, we can start with a very relatively conservative exposure to ultrasound, wait three or four weeks in case of psychosis, and see what the effect is. If nothing satisfactory is produced, one can repeat with a little more in the way of destruction, until one reaches the level of improvement deemed adequate. The second point that seems to me of particular significance is how he foresees the possibility of directing the beam to hit a very small specific location—for instance, part of the hypothalamus —the nucleus that one wants to affect?

James Poppen, M.D.: Dr. Lindstrom, I enjoyed your discussion very much. I must confess that when I first received a letter from Dr. Solomon, asking me to discuss this paper, I wrote to him stating that I thought he ought to look for someone else because I had no experience whatsoever with ultrasonic sound, and anything I could contribute would be nil as a matter of fact. I am, of course, very interested in any advance in technique that can save the cortex. As far as the procedure itself is concerned, I must say that I'm just a bit skeptical about the fact that convulsions won't occur with this sort of procedure. We know of patients who have had concussions and had post-traumatic convulsions later on, and microscopic sections of the brain showed very little. So, I feel that the argument that there is very little microscopic change is probably not valid, and I think that in the first 50 to 60 patients upon whom we performed the standard prefrontal lobotomy no convulsions occurred but did in subsequent patients, so I want to wait a bit until you have done a hundred patients, and see whether or not convulsions appear. This is not a destructive criticism. I think that it is a wonderful thing that you can physiologically change the function of the frontal lobe so that a result that at least simulates a true surgical section of the frontal lobe occurs. I do think that for Dr. Mann's sake that at least here is one gadget and one mechanical procedure that seems to be of some constructive value. Another thing I would like to ask, what was the result of the Funkenstein test in these patients? Did it show that the patient ought to get some change from this particular treatment? You know, I've been very interested in the Funkenstein test with our EST. I don't do EST, however, Dr. Alexander and Dr. Tucker have treated some of our pain cases. I, personally, am not in favor, at the present time, of treating intractable pain with lobotomy. I'm doing fewer and fewer. I think if a patient is going to live for just a few weeks, or a month, it may be worthwhile, but I'm not the type of individual that is afraid to give narcotics in a fatal disease. I think it is perfectly silly. Just because a patient is getting relief with narcotics—and if he is going to die within a few weeks or months—to deny him relief by nonoperative means is silly. At first, I was very enthusiastic about lobotomy for pain, but I am not at the present time. However, I may become enthusiastic if ultrasound is of help. I was interested in the one section that Dr. Lindstrom showed, where the defect was considerably behind the anterior horn involving the anterior portion of the basal ganglia. I was just wondering if in that patient the change in the basal ganglia was caused by directing your beams that far posteriorly. I do want to compliment you on your investigative work and I think it is intriguing and I hope that it will stand the test of time.

H. Thomas Ballantine, M.D.: I wish to join the other discussors in complimenting Dr. Lindstrom on his lucid presentation. As Dr. Solomon has said, this is a method which may have a real application in the therapy of the nervous system. I believe that Dr. Lindstrom has shown in humans, beyond question, what has long been known in animals: that ultrasound of high enough intensity can cause destruction within the brain.

I would like to know, however, whether Dr. Lindstrom can give any figures as to the ultrasonic intensity necessary to produce a brain lesion and also whether he is able to predict with some accuracy the path of the ultrasonic beam through the brain and the exact depth at which an area of destruction may be expected.

Peter A. Lindstrom, M.D.: I appreciate very much the constructive criticism of the discussants.

The question that Dr. Solomon brings up, namely how to produce a selective, well localized ultrasonic lesion in the subcortex is very

intriguing. In the animal experiments a necrosis in the centrum ovale or the internal capsule was repeatedly made with minimal histological changes in the intervening tissue; in humans the gross necrosis was limited to the prefrontal white matter. The location of such increased absorption of sound energy depends on the intensity, the method of application and on the fact that some elements and strata of the brain tissue are more sensitive than others. I doubt that a single ultrasonic beam could produce a total necrosis of for instance a certain diencephalic nucleus without any damage to neighboring tissue, even if it were possible by stereotactic means to direct accurately a beam to such a deep, small structure. Multiple beams focused to one point require a very large bone flap or widely separated trephines of the skull and therefore become somewhat impractical for clinical work.

When ultrasound goes through the skull bone it is to some degree deflected and scattered. The path of the ultrasonic beam through the brain on the other hand probably goes along straight lines. The necrosis that may develop within an intense ultrasonic field does not necessarily spread symmetrically along the beam axis since the absorption of sound energy is increased along, for example, fiber bundles. I think it is easier to direct the soundbeam with accuracy than the leucotome or the suction tip. A stereotactic device could of course be used. As Dr. Ballantine knows from his own studies with ultrasound for localization of the ventricles the measurements of sound intensity are only approximate. Minimal histological changes occurred in human brains after five minutes transdural irradiation at about 7 watts per square centimeter. Gross lesions in the centrum ovale were caused by 12 watts per square centimeter in 2½ minutes. However, the effect varies with the technique employed for transmission of sound. A wide beam of 8 watts per square centimeter can by focusing be transformed to a narrow beam of a few mm. diameter and an intensity of several hundred watts per square centimeter. One could hardly expect a lobotomy effect from a total necrosis in a pin point area of the prefrontal region. In general a 2 to 2½cm. wide beam was so applied that the maximum damage in the prefrontal lobes occurred in the central parts of the white matter and this damage was usually much less severe than a gross necrosis.

I agree with Dr. Poppen that convulsions might occur in the future especially if higher sound levels were employed for production of larger necroses. With the technique of irradiation that I have used here, cortico-meningeal scars are avoided. The fact that all postoperative electroencephalograms were normal should give us further reassurance that convulsions will be rare. In the section that Dr. Poppen refers to the necrosis was limited to the white matter above the anterior tip of the lateral ventricle. The beam axis had been directed slightly posteriorly. The reproduced cut through the brain was made in the same plane and the most anterior part of the ventricle irradiated. The frontal pole of the caudate nucleus, reaching about 2 or 3 mm. from the anterior tip of the ventricle was seen on the section but showed no defect nor were there any clinical signs of a basal ganglia lesion. With respect to the selection of cases the patients with pain had not obtained relief in spite of very heavy narcotic medication. In most instances there was a large component of anxiety or depression or both in the symptomatology. The patients who postoperatively obtained the least relief in their suffering were among those whose agony seemed to be due to true organic pain. I have not used the Funkenstein test among these patients.

BOSTON SOCIETY OF PSYCHIATRY AND NEUROLOGY

Meeting of April 15, 1954

DR. WALTER WEGNER, *President*

DISORDERS OF CHARACTER: PERSISTENT ENURESIS, JUVENILE DELINQUENCY AND PSYCOPATHIC PERSONALITY. *Joseph J. Michaels, M.D.*

The suggestion that there is a specific class of psychopathic personalities of a persistent-enuretic delinquent type might lead to a re-evaluation of the respective roles of constitution, maturation and experiential development. The elaboration of the persistent enuretic pattern characterized by a lack of control should lead to a more intensive study of this type of mal-integration, and probably also of the obverse situation in which very early control of the urinary

sphincter establishes an "over-control" pattern leading to a compulsive neurotic formation of character where social adjustment is "too moral." Thus at one extreme, impulsiveness would coexist with psychopathic personality (weak ego—persistent lack of sphincter control) and at the other extreme, compulsiveness would go hand in hand with the compulsive neurotic character (strong ego—early sphincter control).

To make a place for persistent enuresis, juvenile delinquency and psychopathic personality in psychoanalytic theory, it will be necessary to assess properly the urethral zone and to fit it into the ego-libidinal series of development where disorders of character have rarely been allocated a specific locus. If to Freud's typology of erotic, compulsive and narcissistic types, the impulsive type of character (impulsive psychopathic and impulsive neurotic) can be added, a more comprehensive framework becomes available. Impulsiveness as related to the urethal zone would form the counterpart to compulsiveness associated with the anal zone. It might be that the traumatic neurosis and epilepsy could be more easily related to the impulsive type. The psychobiologic contrasts of the psychopathic personality and compulsive neurosis suggest important social implications.

Discussion

Dr. G. Colket Caner: Is it your feeling that because sufficient effort is not made to bring about effective sphincter training children later become delinquent, or do you mean that the fact that efforts at sphincter training are not successful indicates that efforts to train children in other ways will also be unsuccessful?

Dr. D. Denny-Brown: Has Dr. Michaels carried out cystometograms in any of these patients? Would he further define "persistent enuresis"? The common enuresis in childhood is a periodic, nocturnal enuresis, related to other evidence of the "nervous child"—night terrors, multiple tics, poor posture, etc. In such children cystometry does not demonstrate any defect in bladder mechanism. Such enuresis is a disorder of sleep. There is another type of enuresis, a more constant and persistent enuresis, that is diurnal as well as noctural, and not necessarily associated with any neurological or psychiatric disorder. One case, for example, was a professional colleague—a successful surgeon, who since earliest childhood had such enuresis. He occasionally had diurnal enuresis, through inconvenience of facilities or through some excitement or exertion. On examination such patients are found to have complete inability to restrain sphincter control after the bladder is distended beyond 150 to 180 cc. Control was normal below that volume. We believe this type of enuresis results from an inborn, fixed difficulty in inhibiting the bladder beyond a certain volume of contents. There is no evidence of associated spina bifida, and the reflexes are quite natural. There is no other evidence of failure to develop corticospinal control. This type of persistent enuresis is indistinguishable from that seen early in some forms of diffuse brain disease, though it is then associated with some generalized increase in tendon reflexes. Is this the type of enuresis associated with psychopathic personality?

Dr. Wilfred Bloomberg: Two points I should like to make. The first is that we are pretty well accustomed to the fact that the Kraepelinian and Bleulerian approach to the psychoses has given way to a more dynamic method of looking at things. What has lagged behind in this method of approach is the group called the psychopathic personalities. It is therefore of interest to me that whether Dr. Michaels is right or wrong in his formulation he is at least prepared to present and define a category of psychopathic personality based on a dynamic formulation that goes beyond our ordinary classification of character disorders.

Secondly, it is of interest that Dr. Michaels, who is a psychoanalyst, brings to us here a combination in looking at this problem of the psychoanalytic, the psychological, and the biological in an overall approach. It is interesting that he postulates constitutional factors as a possibility, that he postulates that the same dynamic factors which lead to persistent enuresis are those factors which lead to psychopathic behavior in later life. I would assume that he takes it for granted that the psychopathic behavior is not due to the fact that the child wasn't toilet-trained in childhood, but that he was unable to respond normally to ordinary training because of other constitutional and dynamic factors. Dr. Michaels gives evidence that he thinks of a biological and psychological continuum.

These two aspects above seem to me more important than the statistics which he has presented.

Dr. Michaels: I am greatly indebted to Dr. Bloomberg for his remarks in which he so well expressed the philosophy of my work. It is difficult to present succinctly 20 years of research within the confines of 20 minutes. I have tried to indicate how the data, which was first collected in 1933, have been reinterpreted with the changing in my frames of reference beginning

with neurology, psychiatry, psychobiology and, finally psychoanalysis. He emphasizes that the work should not be looked on merely from a statistical standpoint but should be viewed as an attempt to confirm a clinical hunch and a holistic way of looking at the personality. The question can be raised whether the thesis which I present, which is that persistent enuresis is a a reflection of sphincter "immorality" and is a paradigm of the later social "immorality" of the person who has become a delinquent and psychopath, is valid. It would seem to me that the fact that there is a congruence of findings from various samples of delinquents in this country by different authors in this country and in England and France would confirm the validity of the data.

Dr. Bloomberg's comment that there is an attempt at dynamic formulation which includes psychopathic personality is significant. The reason that the problem of the psychopathic personality has been so neglected in psychoanalytic thinking is the fact that so few severe psychopaths lend themselves to classical psychoanalysis. They have the least amount of suffering, conflict, reactive formations and insight. I think the fact that in Freud's work there is little mention about psychopathic personalities is probably due to the fact that he, himself, probably treated few, if any. It is well known that before a psychopathic person can be successfully treated, he has to become a neurotic—in other words, to make himself amenable to psychoanalytic treatment. Whether the hypotheses as presented are right or wrong, time will tell. However, I would like to emphasize that I do not believe there is any doubt as to the statistical validity of the data.

I was not clear about Dr. Caner's question.

Dr. Caner: Did you mean to imply that because children were not getting adequate sphincter training, they would become delinquents?

Dr. Michaels: I am glad that Dr. Caner raised this question because if it is not the implication which I meant to leave. However, the reverse is true in the sense that when we review the histories of severe delinquents and severe psychopaths, there is a high frequency of persistent enuresis. If a child has persistent enuresis from birth, it does not mean that he will become a delinquent. However, I believe that if he does not become a delinquent, he will develop some disorder of personality of a rather serious nature.

In reference to the comments of Dr. Denny-Brown, unfortunately we did not carry out intensive individual studies in the various samples presented.

In regard to cystometrograms, we, ourselves, did not carry these out. However, I would like to refer to a study of H. Stalker and D. Band: Persistent enuresis: a psychosomatic study, *J. Ment. Sc., 92:* 324, April 1946.

"Eleven of 15 cases who were subjected to cystomethographic studies showed typical uninhibited neurogenic bladders with high pressure, low capacity, early uninhibited contraction and early desire to void—the same type as is found in subtotal organic disease of the higher cerebral centers or spinal cord pathways."

As a definition, we considered that enuresis persisting beyond the period of three years would be considered unusual, that the bed-wetting would have to occur at least once a week. If it were diurnal, it was included in our original study in normals. We learned that it was important to make a distinction between persistent enuresis which is continuous from birth and enuresis which occurs after control has been established, which we have designated as neurotic enuresis.

It is of great theoretical interest as to why it is that the sphincter control which is the last to be established in the development of children is that of the urinary one. When there is a loss of consciousness, or in sleep, the sphincter which is first lost, the urinary one, gives up its control. To date, I have been unsuccessful in learning why this is so. If anyone has any information on this point, I would be grateful to hear from them.

AMORPHOSYNTHESIS FROM LEFT PARIETAL LESION. *D. Denny-Brown, M.D., and Betty Banker, M.D.*

A righthanded patient, aged 36 years, suffering from a left anterior parietal lesion (probably a small hemorrhage from a vascular anomaly), presented anosognosia, denial of right limbs, and disorder of dressing and shaving on the right side. There was loss of position sense and two point discrimination in the right limbs, more severe in the arm than the leg, with loss of tactile localization in the distal parts of the limbs. The case has since been reported in *Arch. Neurol. & Psychiat. 71:* 302-313, 1954.

In this case the disorders of recognition usually found in patients with right parietal lobe lesion were present as a result of lesion of the dominant hemisphere. They are one-sided disturbances, and are related to an elementary physiological disorder of the perceptual process called amorphosynthesis. They are not due to the bilateral disorders of conceptual function that

constitute the true agnosias. Anosognosia was found to be related to defective morphosynthesis of somatic sensation and not, as has been thought by others, to disturbance of visuo-spatial aspects of perception. There is release of a type of motor behavior called the "avoiding reaction," seen as an involuntary extension of the hand, and a disinclination to discuss the affected parts.

Discussion

Dr. Andras Angyal: The authors localize the lesion responsible for amorphosynthesis in the parietal lobe. Previous reports have referred similar syndromes more specifically to lesions in the tissue along the interparietal sulcus, in the gyrus angularis and supramarginalis. Is there in the authors' findings any evidence of such narrower localization?

I became interested in this type of phenomena, first in connection with certain studies I made on space orientation, then later in studying a certain type of schizophrenia. The subjective symptoms of these schizophrenics showed striking similarities to patients with the so-called "interparietal syndrome." Objective neurological findings were, however, few (e.g. occasional defects of tactile localization, two point discrimination) or entirely absent. The pneumoencephalographic findings in a small series of such cases were somewhat suggestive of cortical atrophy including the parietal area, but by no means conclusive. On the basis of my own studies I believe that in these types of symptomatology the psychologically central disturbance is in the organization of kinesthetic space, while other symtoms—e.g. deviations of visual perception—are secondary to this central disturbance.

Dr. Robert S. Schwab: Were temperature and pain discrimination tested quantitatively in the two hands? Could the involved hand distinguish the same degree of light pain and temperature as in the good hand, particularly in the early parts of this illness?

Dr. Raymond D. Adams: This type of case throws light on several rather abstruse problems. I would agree that it is a striking example of what we call anosognosia in a right handed individual. There are few such cases on record. The difference between sensation and perception or, when there is a deficiency, between anethesia and agnosia was emphasized. This is a problem of interest. The traditional view is that sensation is the most elementary form of sensory experience, awareness of objects and perception is the recognition and percept of objects. This comes from structural psychology and use of simple tests. The authors have shown that there is reason to doubt that in many cases called agnosia sensation remains intact. The important point is made by Dr. Denny-Brown that there may be a defect in sensation, providing you examine all the attributes of the stimulus itself —duration, time, and spatial relationships. This work supports the point that Goldstein and Bay have been trying to make, that agnosia is related to an elementary disorder of sensation. I am sure there is more to it than that. I would like to hear a further discussion from Dr. Banker or Dr. Denny-Brown. In a thing as complex as agnosia, can one specify other deficiencies in the patient? The patient usually makes quite erroneous judgments of himself. He doesn't seem to appreciate a sensory defect, and doesn't realize something is the matter, or ignores the part. Is there always some degree of confusion or inattentiveness? It seemed the anosognosia dropped out early. Did it clear up as the patient became more alert and more capable of focusing attention?

Dr. Denny-Brown: In this case we have approached the problem as a study in phenomenology, and do not have precise anatomical verification. We have one case with a good history of these disorders, but not studied in detail by ourselves, where the lesion involved only the interparietal region on the lateral surface of the brain. Cases described by others presenting these phenomena have had more gross lesions of the parietal lobe.

In the case reported here we did not carry out quantitative temperature tests. We were interested in the general nature of the disorder and particularly the heavy predominance of somatic spatial disturbance. Disorder of dressing and denial of limbs has previously been supposed to involve the visual spatial mechanism. This patient did show quantitative disturbance in relation to pin prick. It required two or three pins pricking the affected limb to abolish extinction by one pin on the normal side. It is interesting that the patient then says that it still feels like only one pin, but clearer than the prick produced by one pin. Temperature and pain are disturbed in this way by cortical lesions, as are other sensations.

Dr. Adams points to a real difficulty in terminology. We must apologize for the word amorphosynthesis. It was difficult to find a new word for an intermediary stage of perception, distinguished from lower levels of sensory process on one hand, and from the more complex disorders called agnosia on the other. Both amorphosynthesis and agnosia are disorders of perception. This patient was not confused in

the ordinary sense at the time he denied his limbs, but confusion commonly complicates this picture in left hemisphere lesions. Disorientation of person commonly submerges anosognosia and denial of limbs. The abnormal behavior of amorphosynthesis is then overtaken by a larger process which we would call disorientation of person, and the disorientation of speech that Head called syntactical aphasia. Confusion is usually shown by disorientation in time, place or person. These are wide, all-embracing mental and symbolic concepts. In the patient we have discussed confusion in this sense was not present at any time, but behavior relating to a more elementary and restricted process (morphosynthesis) was confused. It is of special interest that the patient referred sensation in the fingers to the region of wrist and forearm, and sensation from the shoulder towards the forearm. There was a shift of perception towards the elbow. In his mind his limb was foreshortened. The limb has also become insignificant in a biologic sense, and is ignored by the organism. We believe that anosognosia belongs to this disturbance of behavior, and is a derivative of the altered spatial quality of somatic sensations. It is certainly of interest that the disturbance of biologic behavior called schizophrenia should sometimes exhibit similar types of defect.

VARIANTS OF THE HYSTERICAL PATTERN. *Andras Angyal, M.D.*

This is a discussion of three variants of hysteria; simple hysteria, hysteria with negativistic defense and borderline hysteria.

1. The basic pattern in hysteria is an adjustment by vicarious living. This implies on the one hand an almost global repression of one's personality characteristics, and on the other the acquiring of a substitute personality which may be internalized or remain external to the patient.

2. In hysteria with negativistic defense, there is an additional defensive layer around the simple hysterical structure. The defense is against one's own suggestibility and against the tendency towards excessive repression.

3. The borderline hysteric abandons himself to his pathological productions and deliberately cultivates them. He lives in a semi-delusional phantasy world and has some tendency to act out his phantasies. In spite of the pathological inner life, these people may be efficient and superficially well adjusted.

Discussion

Dr. Wilfred Bloomberg: I think we have just heard a large number of interesting ideas beautifully expressed. I wish it were 8:30 instead of 10:30 and we had more time to discuss this paper. I wonder, however, if Dr. Angyal could tell us in this formulation of his where hysteria leaves off and paranoia begins; where the pathological life begins; where hysteria leaves off and psychopathic personality with impulsive behavior begins. This means, of course, that I think there is a certain semantic confusion between us. We would need to start at the beginning and define our personal concepts of hysteria and hysterical personality. I admit this expresses a lack of understanding on my part, but I find the frame of reference somewhat strong and realize that with this paper limited to 30 minutes, it is unfair to expect Dr. Angyal to clarify it in a short time.

Dr. Joseph J. Michaels: One may well agree with Dr. Angyal's clinical description in which he clearly showed a developmental sequence from least disturbed, less so and finally a malignant type. When one deals with a psychiatric disorder one observes that conflicts occur from all levels of the personality. Dr. Angyal demonstrates that although the predominent character structure of the patient may be hysteria, there may be an intense depressive factor. Such features as needing support and supplies from the outside world, a close relationship to a mother figure (symbiosis), the need for being liked and the desire to eat a great deal occur frequently. It is of some interest that Judd Marmor emphasizes this depressive quality in hysteria in a recent paper: Orality in the hysterical personality, *J. Am. Psychoanalys. Assoc., 1:* 656, Oct. 1953.

The second type which Dr. Angyal describes as hysteria with negativistic features may also be regarded as having a paranoid admixture. And, finally, the third type—the malignant form of hysteria—borderline in nature and giving an impression of a schizophrenic coloring, indicates regressive components from the deepest levels of the personality.

Thus each person has his own specific major character structure with conflicts and unique defense mechanisms emanating from all levels of the personality. From my clinical experience, I have often had the impression that there is a "psychotic hysteria character" and I think this tallies with Dr. Angyal's excellent description of the malignant type of hysteria.

Although Dr. Angyal may have a different theoretical frame of reference than Dr. Bloomberg and myself, nevertheless I think I can agree with his keen clinical descriptions which he presents so vividly in an ascending degree of severity.

Dr. Angyal: Because of the shortness of time I am not able to answer satisfactorily all the questions raised. I wish I could give some of the case material on which my considerations are based, but for this we don't have time. The psychological consideration was not my primary interest. I rather wished to describe a specific type of neurotic pattern, the method of "vicarious living" and certain layers of defenses which may be superimposed on it.

Depressive features do occur in these clinical pictures, but by no means are they constant or striking.

Dr. Bloomberg's remarks seem to refer mostly to what I called borderline hysteria. Indeed, for some time I was myself uncertain as to the nature of this condition—trying to understand it as some atypical paranoid state—but extensive study of a series of such cases convinced me of its basically hysterical structure. The phantasy productions of these patients are clearly different from the delusions of psychotics. These patients differ in several respects also from psychopathic personalities, particularly by the tremendous amount of anxiety which they exhibit.

MASSACHUSETTS SOCIETY FOR RESEARCH IN PSYCHIATRY

Meeting of October 27, 1954

RUDOLPH KALDECK, M.D., *President, Presiding*

The Polygraph Approach to Research on Psychotherapy.

1. INTRODUCTION AND METHODOLOGY. *Milton Greenblatt, M.D.*

Although a major portion of the psychiatrist's time is invested in psychotherapy and a large body of theory has been developed concerning the process of psychotherapy, there are relatively few reports of direct systematic observations of the interview situation. We have attempted in our laboratory to bring the interview under direct examination at three levels: physiological, sociological, and psychological, and have developed a polygraph which makes it possible to record many variables simultaneously.

The polygraph first developed by *Ax* in 1948 has been used successfully to study physiological changes of lobotomized cases. In these studies, it was shown that a remarkable reduction in sympathetic tension accompanies the drop in anxiety which is usually found. With *Ax* and *Schachter,* we also studied in another experiment the physiological differences between anger and fear, showing that anger is more like a norepinephrine discharge, and fear like an ordinary epinephrine discharge. With *Dr. Lin,* we attempted to study cortical-peripheral relationships in a case of subclinical petit mal showing that petit mal electrical bursts are accompanied by respiratory changes which fluctuate in relation to the patient's emotional state.

In our present procedure, interviews are carried on in a "therapeutic chamber" which is an air-conditioned and sound-conditioned room. Electrodes are attached to both patient and psychiatrist for simultaneous recording of physiological activity of both persons in the next room on an Offiner modified polygraph. In addition, an interaction chronograph is recorded. Two observers, peering through a one-way mirror and listening to the interaction, classify the interaction on a sociological and psychological basis using coded signals which are entered on the polygraph tape. The verbal interchange is recorded on magnetic tape which is synchronized with the polygraph record. Thus data from the physiological, sociological, and psychological levels are recorded simultaneously and continuously and may then be analyzed to give an integrated picture of the process of psychotherapy.

2. PSYCHOLOGICAL OBSERVATIONS IN PSYCHIATRIC INTERVIEWS. *Alberto Di Mascio, M.A. and Elsi Suter, M.D.*

Some preliminary findings on correlations between selected psychological and physiological parameters, recorded simultaneously and continuously during psychiatric interviews, were discussed. Data were presented showing that: (1) During one period of high rapport the heart rate of the therapist and patient fluctuated together (Concordance) and during one period of low rapport they fluctuated in opposition (Discordance). (2) In a series of interviews by these therapists with each of three subjects, one therapist consistently produced a lower mean heart rate in each subject. (3) The reativity of the

therapist's heart rate was fully as great as that of the patient (suggesting emotional involvement in the situation as great as the patient's). (4) In interviews clinically evaluated as being high in anxiety, as compared to those low in anxiety, there was a lower but more unstable finger temperature and a higher and more stable heart rate. (5) In interviews appraised and subdivided according to clinical material, the major shifts of clinical importance (i.e., topical content, emotional expressions, defensive maneuvers) coincided with periods of similar reactivity in the finger temperature—the more subtle variations (such as in intensity of expression) corresponded to the directional shifts in heart rate lability. (Heart rate lability was quanified by a new statistic, called the D-score, developed in our laboratory.

3. Some Influences of an Experimental Situation on the Psychotherapeutic Process. *Peter D. Watson and Stanley S. Kanter, M.D.*

The *aim* of the paper is to report on an investigation into (1) whether research techniques including observation and physiological recording can be incorporated into psychotherapy without destroying the process of treatment; (2) what the influences of such an environment are on the therapeutic process and participants.

The *method* used consisted of the conducting of 44 analytically oriented therapeutic sessions with one patient with a polygraph in an adjoining room recording the EKG from both patient and therapist, the patient's respiration and finger skin temperature. Two observers watched the therapy through a one-way screen and the treatment was tape recorded. Both patient and therapist were given a battery of psychological tests before and after the 44 sessions.

The *scope* of the paper includes a description of the resolution of the patient's concern about the environment. The presence of some professional, social, and personal complications which were heightened by the research environment suggests a more general validity for the findings.

Findings of the study were: (1) that striking therapeutic progress was obtained simultaneously with valuable social, psychological and physiological data; (2) that the anxieties of the patient and therapist about the situation could be dealt with in the course of therapy; (3) that the therapist's anxiety was tolerated sufficiently to allow the working through of the patient's anxiety.

Conclusions obtained from this study are: (1) a definite demonstration that marked psychotherapeutic progress can be obtained in an experimental setting; (2) that the patient developed transference relationships with unknown observers; and (3) that the experimental situation may complicate treatment but that it may also facilitate the resolution of some of the patient's problem areas.

Discussion

Stanley Cobb, M.D.: I have always admired the research methods of Dr. Greenblatt, and the men who work with him. I think they have really worked out extraordinarily interesting things. One thing that is striking in such experiments is the making of records of a large number of variables. Of course, in the extreme case, we would try to record everything; then we would be really recording nothing, because it would have no selection. In other words, what I am trying to say is that the research man who is successful is the man who has the right "hunch" and who uses the right apparatus in the beginning, and can amass a lot of observations. I'd like to ask Dr. Greenblatt if he had a record of the words of the interviews on a tape recorder? I also want to congratulate the Society for the fact that they have papers presented that are "in the works." That is the most interesting sort of a meeting to me.

About this D-score—I would like to ask how the D-score shows variability?

I wouldn't be a bit surprised if one of the most significant changes of which you can make a record would be the voice pitch all through an interview like this. The interaction chronograph taken along with emotional changes in the voice might be very significant. You might find it easier to record than heart rate, skin temperature, and so forth.

Milton Greenblatt, M.D.: We wish to thank the discussants for their careful consideration of our work and for their helpful suggestions. We have many variables to contend with and a long period of data analysis before the information can be correlated and integrated into a meaningful whole.

In answer to Dr. Stanley Cobb's question, we do have magnetic tape recordings of all the interviews. These have been typed up and have been indexed in a very careful manner so that it will

be possible to correlate various aspects of the interview with physiological data. Also in answer to Dr. Cobb's question, our interaction polygraph does register in a rough quantitative way, the voice pitch. We are glad to hear his conviction that a pitch analysis will be significant. We are familiar with Chappel's elaborate analysis of verbal interaction patterns, but have as yet made no experiments of that type with our data.

The method of analyzing heart rate determines to a large extent the results found. We have found it necessary to analyze heart rate on a beat by beat basis, a laborious procedure but the only one which takes into account all the fluctuations.

Our engineer, Mr. Golahny, has helped us greatly with devices for simplifying our data extraction and is now working on an automatic heart recorder which will be a great time saver. The D-score (measurer of heart lability) a statistic which was invented by Alberto Di Mascio is also based on a beat by beat analysis.

As Dr. Holt has suggested, we try to become familiar with each day's recording by repeated intensive and thoughtful listening to the record.

BOOK NOTES AND REVIEWS

Books received are acknowledged and given a brief description in this section. Selections serving a variety of interests will be made from these for a more extensive review, as far as space will allow.

BOOK NOTES

Kütemeyer, Wilhelm. KÖRPERGESCHEHEN UND PSYCHOSE. [Stuttgart: Ferdinand Enke, 1953. Pp 156. Pr DM. 17.50.]

This paper covered monograph presents a thorough psychosomatic study of a patient with mitral disease and cardiac decompensation combined with endogenic depression, utilizing the dreams as well as the biographical data, memories and fantasies of the subject under investigation.

This type of research sets a valuable pattern as it considers in detail and in order the oral, anal, edipal and other infantile characteristics along with the anxieties, difficulties in eating, hypochondriacal mechanisms and particularly the body happenings in relationship to the dream life. Transformations in the patient's condition are shown, and these factors are discussed also in the light of the researches of other workers.

The dream material comprising the last of the 17 sections of the monograph covers about 45 pages in small print and contains 498 dreams produced by the patient between June 14, 1950 to August 2, 1951. It is to be hoped that additional studies following this type of pattern will be made on patients with a variety of physical disorders, particularly with heart and stomach diseases. Those who read German will find much of value in this publication.

McAuley, W. F. THE CONCEPT OF SCHIZOPHRENIA. New York: Philosophical Library, 1954. Pp. 145. $3.75.

This book by a Northern Ireland psychiatrist was written for medical students who prepare for examinations or contemplate specializing in psychiatry. It is essentially a concise survey of literature. The author frequently takes a stand on controversial matters and limits the expression of his own opinions to a few definite sentences. The survey aims at covering as many issues as possible rather than at a systematic and thorough treatment of any specific issue. Although the author believes that the difference between psychoneurosis and schizophrenia is one of degree, and that the possibilities of psychotherapy in schizophrenia should be investigated because psychotherapy, "reference to the dynamic factors of interrelationship," often helps neurotics, he presents in his chapter on "modern treatments" only electroshock, insulin, and leukotomy. He summarizes the statistics and the arguments of the geneticists, remarking that the validity of these arguments is doubtful because the more thorough the investigation, the more difficult it becomes to decide to what degree, if any, a trait is a function of heredity and to what degree it is a result of environmental influences. Despite his belief that there is no difference in kind between the two disorders, the author emphasises that schizophrenia should be treated very differently from neurosis. The historical survey begins with an observation of Plato who "saw in dreams the tendency of desire to satisfy itself in imagery when the higher faculties no longer inhibit the passions." Kraepelin, Bleuler, Jung, and Meyer influenced the author's views most, as far as clinical data are concerned. The chapter on diagnosis is Bleulerian in spirit and in some detail but is very brief. No cases are used for illustration. Influence of the environmental factors, the neurophysiologic, metabolic, and cortico-hypothalamic aspects also receive attention. This book is a clearly and simply written introduction which can fulfill its purpose very well provided the student has some clinical experience and a good instructor.

Z. A. PIOTROWSKI.

Strong, Oliver S., and Elwin, Adolph. HUMAN ANATOMY: Third Edition. [Baltimore, The Williams & Wilkins Co., 1953. Pp. 481, 357 figures, many colored illustrations. $7.50.]

This well-known text, the product of two remarkable teachers of neuro-anatomy, remains outstanding in its coverage of the field. This third edition is up to date, having undergone considerable revision of some of its parts in keeping with the everadvancing knowledge in neuroanatomy and neurophysiology. The sections on the nerve cells and fibers, the cerebellum, the thalamic nuclei, the subthalmus, the reticular system of the hindbrain, the prefrontal areas and the cortical projection systems have been largely rewritten and enlarged.

The structural mechanisms are well illustrated and, as in previous editions, discussed from the viewpoint of neurophysiology and practical clinical importance. There are 34 new illustrations, an extensive bibliography and a good index. Printed on excellent paper and securely bound, it will continue to serve as a most useful text book for both students and specialists.

BOOK REVIEWS

UBER DAS WESEN DER SEXUALITE. [I Heft, I Teil, Pp. 62, 1952, Pr. DM 5.60.]

METHODEN DER BEHANDLUNG SEXUELLER. [Storungen II Heft: II Teil, Pp. 97, 1952, Pr. DM 9.]

Burger-Prinz, H., Albrecht, H., and Giese H. ZUR PHANOMENOLOGIE DES TRANSVESTITISMUS BEI MANNERN. [Stuttgart: Ferdinand Enke Verlag: Pp. 43, 1952, Pr. DM 3.80.]

These three monographs dealing with various aspects of sexual problems were published in the Bietrage Zur Sexualforschung, the official organ of the German Society for Sex Research. The first two consist of papers given at the 2nd Congress of this society held in Konigstein in 1952. Part I, concerning the character of sexuality, begins with a learned discourse on sensuality and sexuality in the light of theology by Prof. Franz Arnold of the University of Tubingen. Other topics are sexuality and order by Prof. K. S. Bader of the University of Mainz; the political aspects in matters of human sexuality by Dr. H. Giese of Frankfurt a.M.; the character of human sexuality in the terms of the total personality organization by Prof. Niedermeyer of the University of Vienna; constitution and sexuality by Dr. Willhart S. Schlegel of Hamburg; sexuality in the framework of analytic psychotherapy by Dr. H. Schultz-Hencke of Berlin; and finally an inquiry into monism and polarity in theories of sexual pathology by Dr. J. Deussen of Heidelberg.

Reports from the same congress are continued in Part II monograph which is entitled "Methods of Treating Sexual Disorders" with the following contributions included: the psychopathology of disorders of puberty by Dr. H. Albrecht of the University of Hamburg; the psychopathology of selfmutilation by Prof. F. G. Ritter von Stockert of University of Frankfort a.M.; the problem of treating moral delinquency by Prof. P. A. H. Baan of the University of Utrecht, Holland; criminobiological management of moral crimes by Prof. F. Wiethold of University of Frankfort, a.M.; instinct coupling, compensatory drives and ambivalence in self development of the post-conflict period by Prof. E. Seelig of the University of Graz; the subject of sexuality in the framework of group therapy by Dr. H. R. Teirich of Graz; a contribution to hormonal castration by Dr. A. Friedemann of Biel, Switzerland; somatic therapy of sexual disorders by Dr. H. G. Leineweber of Hamburg; therapy of the hypersexual drive type of disorders by Prof. A. Niedermeyer of the University of Vienna; and a report on the results of 500 semen investigations by Dr. K. Steen of Hamburg.

The monograph on the phenomenology of transvestitism in men presents nine case histories of this condition collected in the clinics in Hamburg and Frankfort followed by a

discussion of the literature and theories on the subject constituting an informative document.

These authoritative monographs afford an excellent survey of the extensive field of psychosexual pathology that is well worth a place in the library of those interested and working with these problems that are widespread and commanding attention.

BOOKS RECEIVED FOR REVIEW

BARBARA, D. A. STUTTERING: *A Psychodynamic Approach to Its Understanding and Treatment.* The Julian Press, Inc., N. Y., N. Y.

EISSLER, R. S. et al (ed.). *The Psychoanalytic Study of the Child Vol. IX.* International Univ. Press, N. Y., N. Y.

GEDDA, L. GENETICA, *Medica Instituto di Genetica.* Medica E. Rome, Italy.

LEWIS, H. *Deprived Children.* Oxford Univ. Press, N. Y., N. Y.

LOEPP, W. AND LORENZ, R. *Rontgendiagnostik des Schadels.* Georg Thieme Verlag, Stuttgart, Germany.

WARTENBERG, R. AND KOBCKE, H. *Neurologische Untersuchungsmethoden in der Sprechstunde.* Georg Thieme Verlag, Stuttgart, Germany.

NOTES AND NEWS

ANNUAL MEETING OF AMERICAN PSYCHOSOMATIC SOCIETY

The American Psychosomatic Society will hold its Twelfth Annual Meeting at the Claridge Hotel in Atlantic City on Wednesday and Thursday, May 4 and 5, 1955. This meeting will be immediately preceded by those of the American Society for Clinical Investigation and the Association of American Physicians. It will be followed by the meeting of the American Psychoanalytic Association.

The Program Committee would like to receive titles and abstracts of papers for consideration for the Program no later than December 1, 1954. The time allotted for the reading of each paper will be twenty minutes. The Committee is interested in investigations in the theory and practice of psychosomatic medicine as applied to adults and children in all of the medical specialties, and in contributions in psychophysiology and ecology.

Abstracts for the Program Committee's consideration should be submitted in duplicate, and should be sent to the Chairman at 551 Madison Avenue, New York 22, New York.

MULTIPLE SCLEROSIS HEREDITY STUDY GETS 35 SETS OF TWINS FROM NATION-WIDE APPEAL

Approximately 35 pairs of twins from 19 states throughout the United States and from Canada responded to the recent nationwide appeal for identical twins afflicted with multiple sclerosis, according to Dr. Harold R. Wainerdi, Medical Director of the National Multiple Sclerosis Society.

As a result of the successful appeal, made with the cooperation of hundreds of newspaper editors, preliminary verification for research into the possible hereditary and environmental causes of the crippling disease has gotten under way. Through its Committee on Genetics, the Society plans to commence its research project as soon as sufficient data on the volunteer twins have been amassed, and examples of twins have been selected to meet the rigid requirements of the proposed study.

One of the prime tasks now will be to sift and corroborate data on the twins, to make sure: 1) that they are identical; 2) that one, or both, has multiple sclerosis. For purposes of the planned research, the "ideal" twins would be those sets where one member has multiple sclerosis and the other has not. Both would be studied to try to determine factors which may have been responsible for the disease in the afflicted twin.

NEW RESEARCH GRANTS AWARDED BY THE NATIONAL INSTITUTE OF MENTAL HEALTH UPON RECOMMENDATION OF NATIONAL ADVISORY MENTAL HEALTH COUNCIL, JUNE 1954

Anderson, John E., and Harris, Dale B. University of Minnesota. The relation of childhood behavior to adjustment in adulthood. Three years. First year $14,796.

Bandura, Albert. Stanford University. Relation of therapeutic competence to personality of psychotherapist. One year $1,851.

Blocksma, Douglas, Fox, Robert, and Lippitt, Ronald. University of Michigan. A study of methods for improving social acceptance and participation of rejected children. Three years. First year $27,972.

Blom, Gaston E., and Long, Robert. Massachusetts General Hospital. Study of emotional factors in children with rheumatoid arthritis. Four years. First year $17,981.

Busse, Ewald W. Duke University. Effect of aging upon the central nervous system. Two years. First year $14,534.

Cohen, Louis D. Duke University. The assessment of change in anxiety level. One year $5,400.

Dean, John F., and Williams, Jr., Robin M. Cornell University. Social and cultural factors in adjustment of American women. One year and a half. First year $10,770.

Drake, Miles E. The Vineland State School. Metabolism of phenylpyruvic acid in mental deficiency. Three years. First year $15,869.

Fink, Maxmilian. Hillside Hospital. Perceptual changes induced by drugs and electroshock. Two years. First year $9,612.

Gerty, Francis J., Garner, Ann Margaret, and Wenar, Charles. University of Illinois College of Medicine. Studies of psychosomatic disorders in children. Two years. First year $22,396.

Haggard, Ernest A. The University of Chicago. Family adjustment, personality, and mental processes. Two years. First year $14,018.

Harlow, H. F. University of Wisconsin. Symposium on interdisciplinary research in the be-

havioral, biological, and biochemical sciences. One year $8,910.

Landis, Carney. Research Foundation for Mental Hygiene, Inc., New York State Psychiatric Institute. Sensory and motor tests of CNS efficiency. Three years. First year $21,956.

Lauer, Donald W. Indiana University. Response variables in classical conditioning. Two years. First year $8,760.

Ledwith, Nettie H. Pittsburgh Child Guidance Center. Rorschach responses of elementary school children. One year $9,720.

Loeb, Martin B. Community Studies, Inc. Interaction patterns in a psychiatric hospital. One year and a half. First year $20,262.

Nulsen, Frank E. and Crocker, David. University Hospitals. Evaluation and treatment of chronic pain. Two years. First year $5,972.

Pavenstedt, Eleanor, and Greeley, David McL. Boston University School of Medicine. The effect of maternal maturity and immaturity on child development. Two years. First year $36,085.

Phillips, Leslie. Clark University. The application of developmental theory to problems of social adaptation. Three years. First year $16,102.

Riley, Jr., John W. Rutgers University. Analysis of small group and interpersonal relations. Three years. First year $13,859.

Rogers, Carl R. University of Chicago. The process and facilitation of personality change. Three years. First year $40,000.

Sawrey, William L. University of Colorado School of Medicine. Role of psychological factors in production of gastric ulcers. Two years. First year $8,817.

Semrad, Elvin V. and Greenblatt, Milton. Harvard College. Relation of social interaction process and clinical changes to outcome of psychotherapy. One year $11,930.

Stellar, Eliot. The University of Pennsylvania. Experimental study of the behavior of the marmoset. Two years. First year $4,644.

Wallace, Anthony F. C. University of Pennsylvania. Mental health aspects of cultism. Two years. First year $10,962.

CONNECTICUT POSTGRADUATE SEMINAR IN PSYCHIATRY & NEUROLOGY

The Eighth Connecticut Postgraduate Seminar in Psychiatry and Neurology began its courses of lectures on September 27, 1954 and will continue through May 9, 1955.

From September 27, through December 10, 1954 sessions in clinical neurology, neuroroentgenology, electroencephalography, neuroanatomy, neurophysiology, neuropathology, and review and demonstrations in neuroanatomy and neuropathology will be held on Mondays and Wednesdays from 3:00 to 9:30 p.m. at Yale University School of Medicine, New Haven.

From January 3 through February 28, 1955 (Mondays) from 3:00 to 10:00 p.m. sessions in general psychiatry (psychopathology, clinical psychology, psychiatric syndromes, therapy, psychosomatic medicine, geriatric pschiatry and psychiatry and law) will be held at the Connecticut State Hospital, Middletown.

March 7 through April 11 (Mondays) a course in child psychiatry will be given and April 18 through May 9, 1955 (Mondays) there will be a course in pediatric neurology, at Yale University School of Medicine, New Haven, from 6:30 to 9:30 p.m.

There are no fees for the above courses.

Copies of the program may be obtained from the Office of the Assistant Dean for Postgraduate Medical Education, Yale University School of Medicine, 333 Cedar Street, New Haven, Connecticut.

CHARLES A. ELSBERG LECTURE

Dr. Percival Bailey, Professor of Neurology and Neurological Surgery, University of Illinois, Chicago, delivered the 1954 Charles A. Elsberg Lecture established by the New York Society of Neurosurgery, on Tuesday, November 16, 1954, at 8:30 p.m., at the New York Academy of Medicine, 2 East 103rd Street, New York City. Dr. Bailey selected as his subject "Psychomotor Epilepsy—Its Relation to the Visceral Brain."

Preceding the lecture, a dinner in Dr. Bailey's honor was held in the President's Gallery of the New York Academy of Medicine.

CONGRESS OF NEUROLOGICAL SURGEONS, WALDORF ASTORIA HOTEL, NOVEMBER 4, 5, 6, 1954

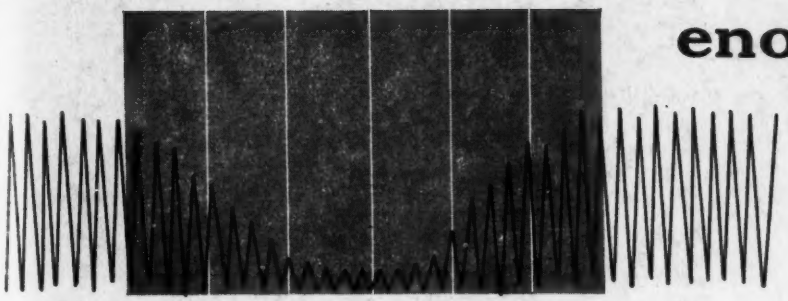
Dr. Kenneth McKenzie of Toronto was the honored guest and delivered papers entitled, "Brain Tumor with Special Reference to Acoustic Neuroma and Benign Gliomas"; "Experiences with Sympathectomy for Vascular Hypertension and Leukotomy for Mental Disturbance"; and "Spasmotic Torticollis, Meniere's Syndrome and

Results following Tractotomy for Trigeminal Neuralgia."

Symposiums on Cervical Trauma by Dr. Frank Mayfield, Cinncinnati, and Dr. Howard Rusk, New York City, were followed by a panel discussion with Dr. Thomas Hoen, Dr. K. G. McKenzie, Dr. Francis Grant, Dr. J. Lawrence Poole, Dr. I. M. Tarlov, Dr. Bronson Ray, Dr. John E. Scarff, Dr. L. M. Davidoff, Dr. Lester Mount, Dr. Jefferson Browder and Dr. D. E. Gutierrez-Mahoney.

A panel discussion on the Medico Legal Aspects of Head Injuries was moderated by Dr. A. Earl Walker of Johns Hopkins University and included Dr. Wm. Caveness, Dean Roscoe L. Barrow of the University of Cincinnati College of Law, and Mr. W. Scott Allan of the Liberty Mutual Insurance Company.

brief enough



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As with all relaxants, facilities for oxygen insufflation must be available when 'Anectine' is given. When apnea does occur, its average duration is about 2 minutes.

References: Wilson, W. and Nowill, W. K.: Southern Psychiatric Meeting, 1952.

Holmberg, G. and Thesleff, S.: Am. J. Psychiat. *108*:842, 1952.

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From ancient "snake-root" medicine, a new agent for modern neuropsychiatric therapy . . .

Serpasil T.M.

(reserpine CIBA)

Recent clinical reports indicate that the oral or parenteral administration of Serpasil—a pure crystalline alkaloid of rauwolfia root—is usually followed by remarkable changes in the behavior of mentally ill patients.[1,2,3,4] Raucous, hyperactive, combative and resistive patients tend to become friendly, cheerful, sociable and relatively quiet.

One group of investigators stated that in most patients Serpasil therapy made possible the elimination of seclusion, restraints of all types, sedation with barbiturates, and electroconvulsive treatments.[2] They added that Serpasil therapy can excel and substitute for electroconvulsive treatments in 75 per cent of mentally ill patients.

As a tranquilizer and nonsoporific sedative, Serpasil is indicated in schizophrenia, paranoia, manic states, general paresis with psychosis, and some cases of depression. Other indications for Serpasil are anxiety, tension, nervousness, irritability, stress, hyperemotionalism, etc.

Parenteral Serpasil at the present time is recommended only for neuropsychiatric conditions in which the drug cannot be given by mouth and should be continued only until it can be replaced by oral therapy.

Serpasil is available as tablets, elixir and parenteral solution. Further information about this interesting drug may be obtained from your CIBA representative or by writing to Medical Service Division, CIBA, Summit, New Jersey.

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SUMMIT, N. J.

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